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*King, J. Cash, and Cocke, Edwin W.: Therapeutic Fever Produced by Diathermy, with Special Reference to its Application in the Treatment of Paresis. South. Med. Jour., Mar., 1930.

A copy of this reprint in full will be mailed on request, together with further information on the Victor Diathermy Apparatus as designed for this work.

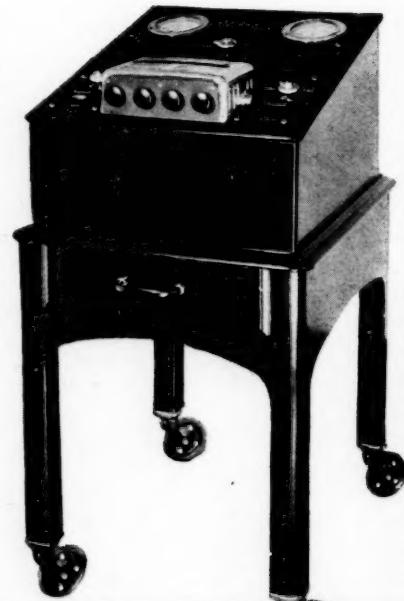
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THE PROBLEM OF TEACHING PHYSICAL THERAPY AND THE MANAGEMENT OF HOSPITAL DEPARTMENTS *

A SYMPOSIUM

NORMAN E. TITUS, M.D., CHAIRMAN; J. C. ELSOM, M.D.; F. H. EVERHARDT, M.D.;
DISRAELI KOBAK, M.D.; EDWIN M. KIME, M.D.; JOSEPH E. G. WADDINGTON, M.D.;
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President Titus: For many years the speaker has been advocating that a section or part of the program be given over to the discussion of education and hospital department management. It is hoped that this gathering this morning will initiate the movement and see to it that it is carried on through each successive meeting of this organization. There is no need to discuss the questions that have already been solved. The speaker, however, believes that we should each year bring to this symposium our problems for general discussion so that we may all cooperate in creating and offering the most interesting hours of instruction to the student and practitioner.

One of the problems that has confronted the speaker in connection with his teaching at Columbia University, has been the lack of opportunity to offer advanced practical instruction in physical therapy. Many factors are responsible for this situation. A program largely restricted to the teaching of medical and surgical subjects offers very little time and opportunity for the student to stray very far from the required courses. The time is limited and the instructor must curtail his desire to expand upon his subject. Our course is therefore limited to the barest essentials, theories and principles of the subject. Heretofore, only the senior students have been permitted to register for this optional course and hence they have had little opportunity to carry out advanced work in the subject. During the present year our lectures are now offered to the junior as well as the senior students. Opportunity for advanced work is therefore open to the senior students when and if they have completed the introductory course.

This idea of teaching the third year classes instead of the fourth year is brought to your

* Meeting of the American Congress of Physical Therapy, Chicago, Illinois, November 4, 5, 6, 7, 1929.

attention and may possibly help in solving one of the problems.

A situation that confronts the Director of any clinic of physical therapy is how to get the patients distributed through the day so that the technicians are not overburdened during short periods. The system that has finally been evolved at the Medical Center in New York is the creation of a book, composed of large sheets, ruled off in squares, each square capable of holding about six names. There are twelve columns of these squares and sufficient rows so that each room or section of a large room has a square of its own. If a patient comes at half past nine and gets diathermy, his appointment is made in that space; and should this be followed by static electricity, another half hour is allotted to him in the ten o'clock square of the static room. Each night or before the clinic opens in the morning and afternoon, the technician in charge of each section goes to the file and picks out the prescription blanks for the patients to be treated that half of the day. These are arranged in order by that technician, who knows exactly what the patients are getting and in what sequence they can be handled. When the patients come in they merely present their card to the desk of the department. When treatment is completed the technician takes them out with their chart to the desk, another appointment is made in the book, noted on their card and the patient is permitted to leave the clinic. In this manner each technician is responsible for the work to be done. They plan out just what the day's work will be and are able to follow the same patient on each visit. This is a more gratifying procedure for the patient as well as for the technician.

In Beekman Street Hospital a system similar to this was used. A large bulletin board was placed in the department, appointments

were made a week ahead and the used sheets were replaced at the end of each day. This worked very well for a time; but it was found that patients were able to change their appointments without anyone knowing it, if the time allotted was not convenient. It is not expected that this system of appointments is the best. It is brought to your attention so that it may bring out discussion today. It must be admitted that the efficient running of a department rests upon the way in which the work is distributed during the day. For those of you who do not have a system of prescriptions, I take the liberty of referring you to the Modern Hospital, in which the Beekman Street System was published in the May 1925 issue. This system has worked successfully since it was started, is the least complicated that can be thought out and gives all the required information for a later check-up of the treatment of a patient. It has been modified by the use of a printed list of modalities at the side of the sheet. Rubber stamps, as originally suggested in the system, increase the flexibility. A system of records should be flexible and simple. Any system which requires that the record be checked about fifty times in order to record sufficient data about the patient works well for a month or so and then, gradually, the details are neglected and the record becomes a joke.

To illustrate to you how the system works, we have a sheet of paper ruled off at the top. The case number, clinic or hospital number is written in over at the right, the patient's name on the left, and both of those above the ruled line. There is another line ruled under that, and, perpendicularly, there are narrow spaces ruled, one for each day. When you get to the sixth space there is a double ruling or a red line. The part to be treated is noted in the square on the left, and rubber stamps of the dates are put here and rubber stamps of the different modalities are also put here. If you have a patient with a contusion of the shoulder or knee, you can put phototherapy here, and massage underneath; and for the knee, phototherapy and static electricity. You can use the same stamp twice, if you want to, or if it is only for ultraviolet, place the ultraviolet stamp here. When this is all filled up (it is good for three weeks) you can put another ultraviolet stamp there and continue using the same sheet.

In another column room is made to write in the length of time of treatment. The rubber stamp shows that that is the doctor's order. The same date is put in here, and the technician who gives the treatment, places her initials in this space. When the patient has had six treatments or comes up to the red line, it is the duty of the technician to tell the patient: "You have had six treatments; you must be seen by the doctor again. Have the doctor see you when you come in next time." A special appointment is made for the patient to be again examined by the director and a rubber stamp is affixed to note the progress, when the patient came to the clinic, and which technician gave the treatments.

It is not difficult to make out a sheet so that you have eighteen spaces, making it good for three weeks of six treatments a week, or for six weeks of three treatments a week. It has been found very convenient, and these are made the same size as the history charts and put right into the main chart in the record room.

Those are just two of the problems that I wanted to present to you. One is the matter of appointments. It is not difficult to get patients into the habit of the appointment system. If they come late once, we excuse them; if they come late again, they are not treated. That fact is noted on their chart. If they keep coming late we just drop them and tell them we can't treat them any more. We are too busy to have them lap over and take someone's else time. They have to report back to the doctor.

Unless patients can be impressed with the fact that they must attend promptly, we don't treat them because they help to confuse the whole system.

Dr. J. C. Elsom (University of Wisconsin): I want to speak about the teaching of physical therapy, especially in universities and colleges, and the necessity for this sort of instruction.

I think we all realize that none of us received any instructions in physical therapy during our student period in college. Our contention is that every medical student that graduates in these days should have at least the fundamental principles of physical therapy at his disposal. Whether the man, when he graduates, will practice physical therapy or

not doesn't matter; but in this day, every medical man, I am sure, should know at least the indications and contraindications for physiotherapeutic measures.

At the University of Wisconsin we have come to that viewpoint, and every senior medical student is referred to the Department of Physical Therapy for a very inadequate time, I must confess. We receive all these senior medical students in small groups, two or three at a time, and they spend two weeks in the department, two hours a day. That is far too little, of course, but you well know that in the crowded medical curriculum it is extremely difficult to arrange everything just as we would like. I think even the fact that we get them two hours a day for two weeks helps to a very considerable extent.

I think you will agree with me that most of the older medical men who are practicing physical therapy have picked up what knowledge they have of the subject in very fragmentary fashion. They have perhaps attended meetings of this type; they have read a little; they have talked with their colleagues, but altogether they have received no adequate knowledge of the physiological effects and the indications of the agencies which we use.

Recently a colleague of mine purchased a high frequency machine. I happened to meet him on the street one day and said: "I understand you have a high frequency machine."

"No, no," he replied, "I have a diathermy machine."

How in the world can you get diathermy without high frequency? This man had no conception whatever of the physics of the machine; he had no idea of what he was doing, and yet, ostensibly, he was practicing physical therapy.

I asked: "Do you get good results?"

"Oh, yes, fine results."

"Do you give these treatments yourself?" I inquired.

"No, I have an office girl. I turn the treatments over to her. A salesman showed her which button to press. We get good results, fine, fine. I made \$35 the other day."

There is his conception of physical therapy—he made \$35 in one day. Gentlemen, if that isn't quackery, what is it? It seems to me so. With this idea in mind, that every medical student should be instructed along

these lines before he graduates, we must see that they properly get it.

In addition to work in physical therapy among the senior medical students, we offer courses in physical therapy in the summer session of the university, a six-weeks course, which is intended very largely for technicians and perhaps senior physical education students, some of whom take up the work of physical therapy as a profession. That, of course, is a good deal more thorough and covers a longer period. Some of them take even a more intensive course. In our department of physical therapy we grant them a certificate after rather a rigid examination and after a lot of practical work.

In addition to that, we have provided a course in physical therapy for the nurses who are in training. This is given to the entire class who are taking the regular nurses training course. We do not attempt to give to these young women a very exhaustive course in physical therapy because most of them, no doubt, will not enter physical therapy as a profession. At the same time we contend that every nurse that graduates should know the underlying principles of physical therapy.

That is about what we try to do at the University of Wisconsin, and I may add that we attempt also to educate the various staff members of the hospital, because they frankly lack education in physical therapy.

When a physician refers a patient to us, for example, for ultraviolet, and recommends an initial exposure of half an hour, we know that something is wrong with that fellow; he evidently doesn't know exactly what he wants. He really means radiant heat and light, but in his own mind there is no definite conception of the difference between radiant heat and light and the ultraviolet.

The point that I want to emphasize is that every medical college should offer courses in physical therapy. Years ago there was not a medical college in the country that paid any attention to physical therapy; now, all the leading colleges give more or less adequate courses, perhaps some of them not as sufficient as we would like. Progress has been made, and for that we should congratulate ourselves.

Dr. F. H. Ewerhardt (Washington University, St. Louis, Mo.): I am afraid that I shall have to approach this problem from a little different viewpoint than that of the two

preceding speakers, because I did not know exactly what was expected of me. I planned in the ten minutes allotted to me to give you an outline of the method which we employ at Washington University, and then to elaborate on it according to the trend of the discussion.

First, the type of patients we have. We have private patients, meaning patients that are sent to us from the hospital. I must first explain that our department is in Barnes' Hospital, but it is under the administration of Washington University Medical School, which administers the medical department of the hospital. The private patients come to us from the hospital or from the outside. If they come to us from the hospital they are either sent down on a prescription or after consultation with me. Generally it happens this way: Some member of the department of internal medicine, or possibly surgery, has a problem. He sends word to my department that he desires to see me in a given time, perhaps, at my earliest convenience. We meet and discuss the case, and decide whether or not we can be of assistance, and the patient is sent down or not, according to the situation. That is as it happens with the private case.

The same holds true in regard to the ward case, the clinic patients, and the dispensary patients. It is, however, not imperative that I be consulted in all cases. They can also be sent in to my service on a prescription and a diagnosis.

We also receive patients from the surrounding hospitals on the same plan, and we receive patients from physicians who have no connection with the surrounding hospitals. When such a physician wishes to refer a patient, he either sends a letter or telephones, and we discuss the problem together.

The financial side of our problem will be of some interest to you, I am sure. We do not for example attempt to sell a diathermy treatment. It is our opinion that we have certain types of apparatus, certain physical agencies (not modalities, but agencies) which we use to treat a patient, and not to sell diathermy or ultraviolet apparatus. When a patient comes to us he is not charged so much for ultraviolet and so much for diathermy and so much for something else. He is treated according to our conception, and we use the method that is best suited to the case. For that reason, we have no chart, such as

Dr. Titus outlined—diathermy for that patient at that hour and static for that patient at this hour,—because it would conflict with my theory on that point. I am not taking issue with Dr. Titus, but that is the way we plan our treatment. That is what makes it interesting: to do the things the way you want to do them.

We have no set price for any given treatment. The fee which we ask the patient to pay depends upon several circumstances. It depends upon the ability of the patient to pay and the amount of time put into the treatment. The charges are calculated on that basis and not on the instruments used.

In connection with our physical therapy department we have also a workshop and an occupational therapy school, which is but another branch of physical therapy. A patient from the orthopedic department, let us say, needs a certain type of treatment. He is treated in the physical therapy department, and from there he may be sent over to the workshop where he does certain work:—carpenter work or weaving or something of that sort, which is applicable for that particular condition.

We have therefore under our direction three treatment methods:—the occupational therapy which circulates throughout the hospital in its work, the workshop, and then the physical therapy department.

You no doubt realize that any of these divisions could be used as a topic of discussion for a greater length of time than that which I am devoting to it, but I am trying to spread my material over the ten minutes allotted to me.

Teaching. We offer the junior students eight hours' lecture work and two hours' practical work. The two hours' practical work is given by dividing the class into groups.

The seniors are given the opportunity to choose the subject as elective work, and they choose from twenty to sixty to eighty hours per year. Our schedule is so arranged that the senior has a great deal of opportunity to elect whatever he wants to study, with certain limitations. A large number, perhaps twenty or twenty-five, elect physical therapy in quantities of from twenty to sixty hours.

The seniors and the juniors are lectured to by the orthopedic staff, of which I am a member. I deliver six lectures from the orthopedic viewpoint, and you may be sure that I stress the advantages of physical therapy as

much as it justifies. In my particular field of orthopedic work, I take care of the feet, the backs, the post-fractures, the bad postures and all the paralytics.

The nurses are given fifteen hours in physical therapy work, not mentioning massage for the moment; that is outside of massage. They get fifteen hours' lecture and four hours' practical physical therapy; that is, hydrotherapy, electrotherapy and light. They receive sixteen hours' massage, theory and practical work, and then they are given further opportunity to come to the department of physical therapy for some special elective work.

Post-graduates. We have circulating through the school year post-graduate students who come for special work, be it pediatrics, heart, general medicine or surgery; and they are offered from one to four hours in physical therapy in relation to those special courses.

In occupational therapy we include about twenty lectures in physiology, and a few more based upon the orthopedic point of view.

Technicians. We have a large number of calls from time to time for technicians. I have outlined a course for physical therapy technicians which takes up a complete school year; and as a prerequisite to that course they must have either two or three years' credit from a normal school of physical education, or nursing education. My object is to teach these individuals to become heads of departments and they should have that background.

How do we work with the hospital staff? That was a difficult thing in the beginning. I learned very soon that not a single member of the department knew anything about physical therapy, hydrotherapy, light or exercise. They did not know the difference between passive and active movement. They don't today, and there is a reason for it:—they did not have the preliminary training.

What are we going to do? I have various methods of attack, if I may put it that way, and one is a little ridicule, depending upon who the doctor is. If he sends a prescription for passive exercise, and I am in the mood, I send or go to him and inquire in a humorous tone, "What do you mean by passive movement?"

Usually I have him stumped. That gives me an opportunity to explain. I tell him all about the difference between passive and ac-

tive movement, and whether passive movement is indicated in that particular case. I try to make friends. I may use a little sarcasm, not to arouse antagonism, but to educate every man I come in contact with. The men I have had best success with are those men of the staff who either had a personal injury or who had one of their own family injured. One of the most violent "antis" that I have had dealings with was one of our fundamentalists, as I call these people in the first two years of the sciences. He couldn't comprehend the virtues of massage or anything in the field of physical training, until, one day, his wife fell off a porch (during my absence in the summer) and severely fractured her ankle. When she came back to St. Louis the surgeon referred her to my department. I converted this man in a fashion that could not have been more spectacular.

Of course, we don't want to break people's ankles in order to convert them, but we try to educate every member of the staff to its virtues, by frankly admitting its limitations and pointing out its great value as a splendid adjunct to medicine and surgery.

President Titus: I am sorry that Dr. Ewerhardt got the impression that we charge by the piece. We charge by the visit, and whatever the patient needs he gets. It may be five treatments during one visit or it may be only one. I have found, however, that there has been an objection about overcharging for ultraviolet light among the private patients. We have reduced it to \$1 a treatment for the private patients, because most of the surgeons are now making a routine procedure of prescribing ultraviolet postoperatively. Every case is treated the next day with ultraviolet light, given every other day, just to help them in their convalescence. They object about our charging \$5 for an ultraviolet exposure.

Another difficulty is that the doctors in the neighborhood have protested about the low prices we charge. They did at first. We had to change our scale of prices because we were then giving ultraviolet baths at fifty cents a treatment; the doctors complained they could not afford to do that in their offices and that we were undercutting prices. In the clinic we now charge \$1 for a visit and ultraviolet light is included in the visit.

With a clinic such as we direct, I have to watch closely to keep it below 200 patients a day. I can have 300 or 350 or 400 patients a day if I let everybody in. We have to keep it down below 200 in order to physically take care of the work. It is necessary for us to have a system of prescription such as I tried to illustrate. Fortunately, I have six doctors as assistants, and there is somebody on duty all the time.

The problem that confronts you, Dr. Ewerhardt, of teaching the doctors, assistants and people com-

ing in for short courses, is something that we also have to face, but I take the stand that we are so busy that we cannot waste any time teaching everybody. We have to have trained assistants who know their work thoroughly, and they work hard

and long. When a nurse gives eighty static treatments in a day, and one gives sixty treatments in the hydrotherapy room in the afternoon, there isn't time to have some neophyte asking questions and upsetting the routine of the technician.

RATIONAL TEACHING METHODS IN PHYSICAL THERAPY

DISRAELI KOBAK, M. D.
CHICAGO

Dr. Titus and the preceding speakers have practically voiced my sentiments with reference to this symposium. There is a definite need for an exchange of opinions in regard to the teaching of physical therapy. The teacher of physical therapy is at present the center of inspiration for the future practitioner. I personally have found very little opportunity to exchange opinions with other instructors in regard to methods of teaching this rather new subject. I have therefore attempted to solve my own problems in my own way.

Physical therapy can naturally be divided into two divisions: its relation to the hospital and its relation to the student and to the medical faculty. I have outlined my few remarks in order to keep within the time allotted to me. It deals strictly with the teaching of physical therapy from my point of view, my impression of the student, and his reaction to physical therapy as taught at Rush Medical College.

The attempt to rationalize the teaching of physical therapeutics and to crowd it into a curriculum that is already topheavy are two of the problems that now confront the various faculties and instructors in many leading medical colleges. The lack of teaching tradition is a recognized handicap to its discipline. Instruction in physical therapy is now a shifting and adventurous problem which can only become stabilized with greater experience and deeper recognition of the fundamental usefulness of its procedures. Medical faculties, in spite of their desire to

cooperate in the fullest measure, have been limited by lack of experience of its theories and practice. Their inherent conservatism has frequently terminated in unintentional reactionary legislation. In spite of well meant co-operation, lack of specific knowledge with reference to its pressing problems has frequently reduced an intelligent and progressive program to a lifeless, half-hearted course of clinical demonstration. In most of the universities the problem has been shifted to the physical therapy department itself without providing the necessary endowment with which to carry out an ambitious program in teaching and research.

The instructor is given charge of a new department, out of which he must build a structure that smoothly fits in with the older traditions. Any radical departure from what is conceived as orthodox or conservative is scanned with suspicion. The instructor must therefore adjust himself to a routine tacitly sanctioned by other departments, to other methods and other interpretations, which frequently are not logically related to his problems, or he must cautiously chip away at the shell of friendly misunderstanding that surrounds him. He must spread conviction and knowledge in two directions—the body of the faculty and the student body. Of the two, the former group is less yielding and paradoxically most desirous to yield. Its members are however, bound by years of experience and traditional teaching in other branches of medicine, which makes an understanding of the rationale of physical therapy difficult. It is difficult for them to arrive at a logical explanation of the effect of a high frequency current because most of them have not had

1. Read in part at the joint meeting of the American Electrotherapeutic Association and the Western Association of Physical Therapy, Indianapolis, September, 1929.

personal experience in interpreting its action. Indeed, some frankly admit their ignorance; others, by a process of reasoning that is humorously illogical, confess open distrust because they are not acquainted with its fundamentals. I have frequently found comfort under such circumstances in quoting the late Elbert Hubbard: "People are usually down on the things they are not up on." To most intelligent practitioners conviction and growing enthusiasm come with time and experience; and the leaders in our profession are certainly no exception.

At Rush Medical College the quarterly system is in vogue, and the student has the privilege to select certain studies, including physical therapy. This has given me an opportunity to study the requirements for teaching the undergraduate and the graduate student, and to recognize the needs and demands of each group. Within the past few years I have varied the instruction in physical therapy so that during some particular quarter stress was placed upon a particular phase of the subject. For one period or quarter biophysical interpretation occupied the major portion of our discussion; during another, I reversed the plan, and the practical side of physical therapy consumed the greater part of our time. There were quarters when both sides of the problem were equally divided. Selected extramural reading from widely varying sources, was recommended as from the works of Lotka, Henderson, Mayer, Mills, Lacquer, Kowarschik, Nagelschmidt, Cumberbatch, Stewart, Grover, Bordier, Vignal, and from scientific journals. The examination at the end of each course consisted of one question: "What was your impression of the course and what suggestions can you make to improve it? Do not sign your name." The answers were illuminating and gave me a guide to future instruction of great value. It was the concensus of opinion that the biophysical interpretation was too technical and mathematical. The undergraduate student appreciated that there was needless repetition of material that he had studied at other times in the departments of physiology, chemistry, physics, and pathology. He advocated a short review of the biophysical background and greater detail in the practical phase of the subject. He was anxious for bedside instruction and demanded personal experiences with the various agencies utilized.

The graduate student was openly impatient with the theoretical portion of the instruction and asked that it be shortened to a minimum. He was frankly interested in the utility of these measures, and accepted the greater portion of all statements with reference to their physiologic action dogmatically and with some impatience. He was critically alert when the problem of technique was expatiated on; the notes taken down at this period were profuse and energetic. He asked many questions and manifested great curiosity in regard to the practical phase of the subject. It was apparent that his purpose was to obtain all the practical information possible. He demanded clinical evidence, detail in the demonstration of techniques, and was anxious to personally administer treatment. He mentally stored up his experience with a morbid hunger. His purpose was to translate his studies into a more flexible therapy. He came resolved to obtain practical experience, and left imbued with greater confidence and hope if he was thus successful.

These experiments in the rational methods of teaching physical therapy have convinced me that the problem that confronts the instructor is a dual one. In general, he must adjust his instruction so that it will fit into the curriculum of his respective institution. Where the time allotted to his course is, say one or two semesters, he can proportionately spread out the didactic portion and develop the theories of physical energies in sufficient detail to create a logical background for the clinical end of the study. With greater time at one's disposal, laboratory demonstrations are fixation points of utmost value. The demonstration of the radiation of cholesterol or inactive oils and the study of spectral line absorptions with the ultraviolet spectroscope is an experience that will indelibly etch itself in the mind of the student and convince him of its specificity in rachitic conditions for all time. The measurement of the heat conductivity and penetrability in living and nonliving material of a diathermic current is a most convincing proof of one of the cardinal effects of high frequency currents. The demonstration of the polar properties of a galvanic current, of drug diffusion and ionization and the concentration of ions with the slow alternating current brings conviction to the student as no amount of speculative theories

will. The visualization method in teaching is highly advantageous, and in physical therapeutics we possess spectacular methods that are demonstrable in a dramatic manner.

The instructor's second and his most pressing problem is to so balance his instruction that he shall devote greater emphasis and detail to the physical measures most utilized by the modern practitioner and indicate their practical utility on clinical material. Personal experience has convinced me that it is impracticable to devote the same length of time to galvanotherapy as to diathermy. Infrared and phototherapy can be limited to their proper importance and greater time given to the exposition of actinotherapy. Massage, hydrotherapy, passive and active motion and corrective exercise, faradism, and electro-diagnosis should be properly balanced in regard to the time given to instruction in each of these branches in accordance with practicability and utility. The clinical side, the techniques, and the complete orientation of physical therapeutics to medicine and surgery should be stressed and frequently demonstrated by example or comparison, and the greater time given to such instruction. Dangers and contraindications should be heavily stressed. The objective in teaching physical therapy should be an attempt at the correlation of all measures, the selection of the one measure that is most logical, and the unification of all conservative forms of therapy for the good of mankind.

President Titus: Dr. Kobak has spoken about electrodiagnosis, which gives me the opportunity, since I happen to be in the chair, to present my reactions to this phase of our problem. We will not do any electrodiagnosis in my department. I tell them that that is a part of the diagnostic procedures, and any man who wants it done can do it himself. Ours is essentially a department of therapeutics, and we can't waste an hour or so solving some man's problem. Every case comes to us completely worked up; we have no original cases; they are all sent to us with the history charts. Everything that is necessary is done; if it isn't we send them back to have it done. I never requisition an x-ray or a blood count or anything like that directly; I make a note on the chart that I think that patient should have such-and-such investigation carried out and leave it to the parent department to do that work.

Of course, we teach electrodiagnosis to the doctors in the post-graduate courses, but that is only because they should know all phases of machines and all ways to handle them. I am always very firm in sending the case right back to the depart-

ment and saying, "This is a therapeutic and not a diagnostic department, and you will have to do that yourself or it will be left undone." Of course, we do it ourselves on our own patients, and keep a private record of them on our own sheets for our own information.

Dr. Edwin N. Kime (Indianapolis, Ind.): I have been very much interested in the present discussion in regard to teaching physiotherapy. The teaching problems of physical therapy as I see them are the problems of medical men, first orienting themselves as medical men, and then giving to others that special information and experience based upon the fundamentals of medicine which they have learned by utilizing special methods. In other words, there is a great tendency on the part of any specialist, physical therapy or otherwise, to over-evaluate himself, to take himself entirely too seriously. That mistake we oftentimes make as physical therapists. If we attend only meetings of physical therapy societies and forget to mingle with our fellow practitioners, in our county and state medical societies, we are overlooking an opportunity in our general medical education. We become biased and lopsided in our opinions.

In teaching physical therapy, then, we must take into consideration this modern machine age and tendency toward over-specialization. We must anchor ourselves very firmly upon the fundamentals of medicine and surgery as we have always practiced them.

At the University of Indiana, the department of physical therapy is an integral part of the department of medicine, that broader portion of medical practice to which we all must subscribe as medical men.

The course as given is a prescribed course, a required course in physical therapy appreciation. It is given in the last half of the senior year, eighteen hours of instruction, and a final examination is given in this course as in all other courses of medicine. The final examination in medicine, I might say, is usually subdivided under three headings. I submit the questions for one of those subdivisions and grade the final examination papers. This is the course in physical therapeutics.

In addition to these eighteen hours of instruction in physical therapeutic appreciation, in which there is a minimum of physics and a maximum of applied physical therapy given the instruction is carried over to the resident graduate physician in one of two hospitals,

the university hospital, which takes a number of our graduates, and the Indianapolis City Hospital, which absorbs a greater number, so that over fifty per cent of our graduates are absorbed by these two hospitals.

It so happens that the instructor in physical therapy at the university medical school is a director of these two departments. He makes regular ward rounds, and visits to the department. An interne is assigned on the medical service who is responsible for the sending of patients to the department for treatment, who in turn confers with the director on each visit to that department. New patients are seen, the treatment of the older patients is checked upon, and if the patient has been in the department longer than two weeks, it is referred back to the staff man who originally was assigned to that case or to whom the case had been assigned for his checking. It is our policy to have the young medical man, the interne or the resident physician, write as many of the orders as possible, and this is always subject to check by the director of the department. It is true that many times rather ludicrous mistakes are made by the staff and by the interne. Nevertheless, it is only by making mistakes and by having them checked by a sympathetic critic that any of us can expect to make progress. We have to learn by experience. My idea is to encourage these other men to write orders and to ask for certain types of treatment, and then, if that treatment is contra-indicated, the patient does not get the treatment because the chief technicians in each department have been carefully instructed as to the major contra-indications of physical therapy. The interne who is most interested in the utilization of these physical energies in connection with his cases, can follow up his cases and can increase his knowledge along this line.

I don't believe that physical therapy has as yet advanced to the stage where we can claim it to be a specialty of itself. I do believe, unquestionably, that it should be practiced by regular medical men.

President Titus: Dr. Kime is to be congratulated on the fact that his course is a required subject. He must be a very good salesman to have sold it to the faculty. It took me many, many years to have received permission to give a course that is optional, and I think Dr. Ewerhardt said his is optional.

Dr. Ewerhardt: Ours is required.

President Titus: You are a good salesman, too.

I think you were the first one to sell it. It is hard to do, especially with a faculty that is as conservative as the one I am up against.

Dr. Joseph E. G. Waddington (Detroit, Mich.): I am going to start with the last speaker, Dr. Kime, with whom I agree in many respects. I think he is to be heartily congratulated upon the way in which he is teaching physical therapy. That brings me to the point where Dr. Titus said that he gave only a theoretical course. If you simply give the theory of physical therapy to these students, they attach no importance to it, or very little, but if you offer them practical demonstrations, they attach some value to that therapy. I believe the teaching should not be purely theory.

I know that Dr. Kime did not exactly mean that physical therapy has not advanced to the point of a specialty. I do not quite agree with him because it is my conviction that physical therapeutics requires highly specialized knowledge and expensive apparatus.

How many of you can afford a \$5,000 apparatus? You have to have that much if you are going to practice physical therapy properly. You are not a physical therapist unless you are using all the different agencies that belong to it.

To show how important it is to have physical therapy directors, in the town of Detroit, the fourth city of the country, there are very few hospitals that have a physical therapy director. I know of a hospital that has some physical therapy equipment but no physical therapy director. It has a girl in charge of this department who has taken a few courses here and there. A girl I trained in my office in a course of six weeks went down there and took charge. I grant you she was a clever girl; but fancy a girl with a training of six weeks taking charge of that department in a hospital in Detroit. Our largest hospital has no physical therapy director, and everything is referred to two girls to take charge of physical therapy. Everything is referred to those girls. When a staff member recently sent down a case, the internes instructions were: "Give this patient ten minutes of ultraviolet three times a day." That was the order that came down. The girl called up the interne and he said, "I gave that order." She tried to get the superintendent but he was away. Fortunately, the order did not say at what distance,

so she put a lamp at one end of the corridor and the patient at the other end.

That is the way physical therapy is understood and practiced in some hospitals at the present time. It is a sad comment on what is being done.

They are not making physical therapy technicians in New York; they are making drugless therapists. Any girl who is employed in your office and handles a machine is a technician, of course, and you wouldn't think it necessary for her to spend four years before she could help in your office, and a lot can be done in six weeks. We have an arbitrary course in six weeks, and in that period by intensive training we attempt to educate them to be technicians, a technician who is a technician, not a drugless therapist. The demand is so large in these offices for trained technicians who can handle machines intelligently that we find in 100 hours' intensive work you can do a lot. I think there is a demand for that kind of work, not to turn out so-called drugless therapists, but well trained practical technicians. As Dr. Kobak has brought out so well, don't teach them so

much biophysics, but give them practical training.

President Titus: In New York the law states that they cannot practice by themselves, but they can maintain an office. All the work they can do must be under a doctor's written prescription. They are not allowed to make a diagnosis or to practice medicine in any sense of the law, although, undoubtedly, they do so when they get friends of patients referred to them. There are about twenty inspectors who go around and watch these people practically once a month. There are 108 physio-therapists now qualified through old experience. They are watched continually. Of course, they are practicing twilight medicine, some of them are also practicing chiropractic, and things equally as futile; but an effort is being made to regulate them. The reason we put the four years in was to discourage these registered physical therapists entirely. They are not supposed to be drugless healers.

In the theoretical course that I give at Columbia it is not all just theory. Any demonstration that can be performed in the electrical room is done. I move in apparatus and rig up spectrometers for ultraviolet and take a high frequency machine apart for them and show them everything I can in the lecture room. Sometimes I have them come down to the department. The idea in regard to the theoretical course is that they are impressed that they are not qualified to do physical therapy after they have finished the course. I shall now call on Dr. Hibben to discuss the relation of the physical therapy department to the hospital staff.

RELATION OF THE ATTENDING PHYSICIANS TO THE PHYSICAL THERAPY DEPARTMENT OF THE HOSPITAL

J. SEVERY HIBBEN, M.D.

PASADENA, CAL.

It goes without saying that before we try to interest physicians in Physical Therapy, we must first educate them as to its value as an adjunct to medical and surgical practice. Much of their background is still bound down by narrow traditions. The profession has seen many new remedies exploited. They come and they go, and all have left their impression on scientific medicine. Pope has aptly said: "The physician does not want to be the first by whom the new is tried, nor yet the last to lay the old aside."

The doctor judges the efficiency of any therapeutic agent by the results obtained; and so likewise does the patient judge the doctor.

How shall we educate the physician? Certainly not by having him attend a course given by an itinerant lecturer and sponsored by some commercial firm interested in the sale of physical therapy equipment. I am certain that some of these men are inherently honest and well informed, but they are sheltered under a cloud of commercial exploitation. Most often, their statements are not based on scientific proof. There is a tendency to exaggerate the facts and their lectures have a suspicious odor of subtle salesmanship. They fail in their purpose and in the end they create in the minds of their critical listeners a feeling of dissatisfaction and suspicion in regard to the

therapeutic value of physical therapy measures. The physician who preaches and practices physical therapy may be judged, as any other branch of scientific endeavor, by the conservatism of his statements. Education in school begins by first providing a schoolhouse, books and teachers; so also in physical therapy. We must first create a physical therapy department, well equipped, with a trained personnel and an experienced director.

As to equipment. Before a physical therapy department is installed, if there is any doubt as to the nature of apparatus, efficacy, et cetera, the Council of Physical Therapy of the American Medical Association should be consulted, and only such apparatus or equipment should be purchased as bears the stamp of their approval. Such a consultation would be the most advantageous effort towards the construction of a well balanced department.

The Council of Pharmacy of the American Medical Association has done more to clarify and "debunk" medical therapeutics than any other single group. Scientific medicine has greatly profited from their exhaustive efforts. The Council of Physical Therapy of the American Medical Association is attempting a similar endeavor for physical therapy.

As to the personnel. We should not think of employing untrained help in the operating room; yet the personnel in some physical therapy departments and many physicians' offices, consist, so to speak, of "switch operators," instructed by no greater exponents of physical therapy than salesmen. It is frequently the case that the physicians employing such equipment are no better informed. At best they have made only a superficial effort to acquaint themselves with the fundamentals. It is from these sources that the extreme critic or enthusiast is born. Their failures are blamed to the agencies and not to their inexperience and they are loud in condemnation of physical therapy.

We require nurses to be trained, to have a degree and be registered; why not the same for physical therapy technicians? There is an association of technicians, the American Physiotherapy Association, a national organization with thirteen chapters in as many states, that issues a bi-monthly journal that contains a high standard of information for technicians. They have high requirements for

membership admission and are doing a great deal to place physical therapy on a high level. We, of the medical profession, should assist them in maintaining the same high standards for their technicians as we do for our nurses. We can in a manner do this by employing only trained technicians.

After we have equipped the physical therapy department with an approved personnel, the next step is to obtain the patronage of the doctor. This can be done by employing a physician well known for his work in physical therapy. It would be good publicity to have the local medical society invite him to its regular meetings, which often are held in the hospital, and adjourn at the end of the scientific program to the physical therapy department for clinical demonstration. Many queries will suggest themselves to the members and this will in the end lead to patients being sent for treatment. This will provide an opportunity to demonstrate the value of this special field of therapeutics. It will also give the director the opportunity to come into intimate relationship with the various members of the hospital staff. No effort should be neglected to exploit these measures. The occasion that is most suitable for this is at the meeting of the local medical societies. One could here present case reports of actual experiences, or even address the society on a certain topic of physical therapy. The distribution of physical therapy articles by highly regarded men in the profession is an acceptable form of publicity and is not considered an undignified form of exploitation. Almost any essayist would gladly furnish them free in the interest of physical therapy.

With recognition there will come competition. The community of physicians will begin to see the possible value of physical therapy to themselves and their patients. The lower level of practitioners, after many unsuccessful years of practice, will seek to increase their income, but as they have no income they will buy cheap, inadequate equipment. The successful member installs good equipment, gets a trained technician but does not bother much to really understand physical therapy. He is too busy. The reaction will be bad in either case. The former cannot succeed; he has poor equipment and is an "off and on switch technician." The latter will obtain good results and will color his experi-

ences in proportion to his enthusiasm. Both are unreliable.

Now the point of the story is this. Dr. Smith, for example, who is trained in physical therapy, has a large and lucrative outside practice and has organized and run the department without salary. He is looked upon with suspicion by the attending physicians who philosophise thus: "Will Dr. Smith get my patient away from me? Why should I permit Smith to prescribe therapy for my patient when only the other day I sent down a case and he changed the treatment and added to the treatment? It is true that the patient got well and seemed surprised that I had treated him for months and had not referred him to the physical therapy department."

In physical therapy as in anything else a little education is dangerous. Any thing goes until jealousy creeps in and the financial flux drifts to the other fellow. To overcome unpleasant competition and the unjust suspicion of your fellow men, it is desirable to introduce as director of such a department a man who is able by virtue of a large experience to take full charge of such a department. He should be a full time man and paid a living salary — one that will free him from any desire to set up in competition with the neighboring physicians.

In the best interest of physical therapy, this man should be specially trained in physical therapy with a good medical and surgical background so that he understands the pathology of the disease he is treating. He should have a good personality, be old enough in experience and training, and should receive a salary sufficient to command the respect of his colleagues.

While such men are now at a premium, many will soon be available, as there are now about eight approved schools offering physical therapy instruction and many medical colleges are including physical therapy as a part of their curriculum. This man should be placed on a salary and commission basis. Any physical therapy department requiring a full time man should be able to pay, as a minimum, \$500 a month and 10% of the net proceeds after deducting salaries, supplies, rent for space, depreciation, interest on investment, etc.

Conclusion and Summary:

1. A full time physician trained in physical therapy should be the head of any well organized physical therapy department. He should function on a salary and commission basis.

2. The technicians should be specially trained and be members of a recognized national organization of technicians.

3. The equipment and space should conform to the requirements of Council of Physical Therapy of the American Medical Association for approved hospitals.

4. Cases referred to physical therapy department by physicians:

(a) Patients should be sent in with a definite diagnosis and, when possible, the hospital record of the case.

(b) That physicians be encouraged to send in their patients with suggestions as to treatment, but with the understanding that if from the standpoint of physical therapy some changes or additions to treatment appear necessary, that these changes may be made, but only after the referring physician be consulted.

(c) In case referring physicians should want to prescribe the physical therapy treatment, explicit orders should be given with the following suggested form filled in:

1. Milliamperage
2. Voltage
3. Polarity
4. Frequency
5. Time
6. Distance.

(d) That once a week patients, after being examined by the head of the physical therapy department be referred back to the physician sending them in for observation with suggestion for further treatment.

5. That no out patients be received for treatment unless they are referred by a physician.

6. That, as far as possible, each patient be treated with the same type and make of apparatus as started with.

7. That as far as possible, each patient be treated by the same technician throughout the course of treatment.

8. That the department have a typed form of standard record as prepared by the head of the department and that, as far as possible, this be followed. In this way the interpreta-

tion of results and failures could be more scientifically correlated.

9. Physicians object to a physical therapy department which is in charge of a part-time physician who is engaged in practice in the same city.

Dr. Tyler (Omaha, Nebr.): I have the honor of being the chief of the department at the Creighton University Medical School, in Omaha, where we have faced problems which have been mentioned by the other men this morning. We started out as a department of roentgenology without any physical therapy in the hospital. Later, as physical therapy developed, we gradually added physical therapy equipment to the hospital, and later established a definite department of physical therapy, both under one director. We have followed that scheme in three different hospitals.

Our teaching is for medical students chiefly. We offer thirty-six hours in the junior year and thirty-six hours in the senior year, and both are required. The junior instruction is divided into half didactic and half practical and is given in the dispensary. The senior instruction is half didactic and half clinical and is taught in the hospital. We have found that the students request chiefly the clinical application of physical agents, as suggested by Dr. Kobak in his experience. We have faced the same problems with relationship to the staff that have been mentioned by other men. We have accepted that as simply a part of the day's work. We have, gradually, by cooperating with the staff and exercising a good deal of patience, received the support of a certain hospital so that physical therapy is universally used by the staff. In the other hospital, due to certain local conditions in that hospital, we have secured a majority but not universal use of this department.

In connection with the teaching at the university, we also offer a course for technicians. We offer two types of courses, one to the graduate nurse. This course is nine months' service in the department under the daily routine work, accompanied by attendance at certain lectures which are a part of the nursing instruction in the hospital and part in the university.

The other course we offer to young women who are not graduate nurses. They must have

a high school training and must spend eighteen months in the department. There is a demand in our part of the country for technicians of the latter class, by men in general practice, who want a young woman in the office to take care of the books, receive the patients, and administer the physical therapy treatments. That is our reason for the training of this type of young woman. Many of the men who have employed technicians of that type have expressed themselves as being well satisfied with the service which these young women have rendered.

Naturally, we can only take in a limited number of these nurses, because they are made regular employees of the department. We usually have one or two graduate nurses and two or three young women who are not nurses.

The pupil nurses in the hospital serve two weeks in their senior year in the department so that they actually come in contact with the use of physical agents.

Because of the fact that the department of roentgenology and the department of physical therapy are under one head in our teaching, we classify x-ray therapy and radium therapy as a part of physical therapy, which it occurs to me it logically should be. Unfortunately, in our medical school, the head of the department is thrown into the surgical service instead of the medical, where I really think it should be, and where I hope before long to have it classified.

Dr. George B. Lake (Chicago, Ill.): I am not connected with any university or teaching institution, but I think, perhaps, my editorial position gives me some authority to speak as a teacher. There are one or two things I want to say.

In the first place, I want to speak about this matter of nomenclature. Physical therapy has been fighting an uphill fight for a number of years. One reason it has fought an uphill fight is that when we who are interested in physical therapy as a scientific method of treating the sick took hold of it, we found the field encumbered with a very complicated and highly unscientific nomenclature which had been foisted upon the method by the irregular practitioners who had sponsored it in time past. So, now, it becomes extremely necessary for us, even to lean over backward a little bit, if necessary, in our use of words, because loosely used words are going to

prejudice thoughtful people, not only against the man who uses them but against the ideas which he is sponsoring.

This matter of "modalities" I have spoken very strongly about, but Dr. Titus raised a point that is interesting.

I have always used an adjective or two in front of that. I have said, "The loose and thoughtless use of the word 'modalities.'" Now there is a perfectly proper use for that word, and Dr. Titus outlined that here a few minutes ago. High frequency currents are a physical agency in the treatment of disease. Autocondensation and diathermy are two of the methods or modalities, if you like that word, of using the physical agency which we call high frequency currents. Heliotherapy is a physical agency in medicine.

That may be applied by the methods or modalities, if you like that word, which frankly I don't at all. There are certain modalities in heliotherapy. We may use the water-cooled quartz lamp. (Again, I dislike that phrase of speaking of ultraviolet light.) We use the air-cooled mercury arc or the water-cooled mercury arc, or direct sunlight. If you like to say modalities, that is a perfectly good word to apply to those different ways of using heliotherapy, but the way the word is used in most of the papers that I hear read and those that I see published, it is used with the word "agency" or some similar word, if Dr. Titus doesn't like that; I have not been able to find a better one that should be used. The only plea I am making in connection with this nomenclature is to use scientific intelligence in the employment of words.

Now as to the teaching problem (and again I am speaking mostly from the standpoint of that extremely important branch of teaching by the printed word) I find that most of the articles on physical therapy that I read in other journals, and some of those that are submitted to me for publication, are very seriously lacking in details of technic. The writer of the article says: "I used diathermy on thirty-seven cases of pneumonia and all but one recovered." But he does not say how large his electrodes were, how long the treatments were that he gave, how many treatments he gave in a day or in a week, what voltage was used, what frequency was used, or anything of that sort. So that a man reading the article has no possibility of being able

to duplicate the technic of the man who wrote it.

My plea is (in writing papers, in reading papers before these organizations), if you are dealing with the clinical features of physical therapy, give your technic in sufficiently full detail that anybody who reads it, without asking any questions, could duplicate the treatment that you have given that patient, and then he has an opportunity to see whether your method of treating that patient is satisfactory. Otherwise he doesn't have that opportunity and the article is of comparatively little practical value.

One more point that was opened up by Dr. Titus and by Dr. Ewerhardt I want to speak about, and that is the matter of finances in connection with the handling of these patients. I feel very strongly that in any chronic case the physician who takes a patient on the basis of so much per treatment is doing an injustice not only to himself but a serious injustice to the patient. In chronic cases, the treatment is always long. The disease has taken a considerable time to develop, and it will take a considerable time to recede; and very frequently there will be days or weeks during which no progress is evident to the patient. The physician understands this, he knows that it is necessary to lay a certain basis, that certain changes will take place in that patient's body of which the patient will not become conscious for some time, and that the patient will experience a sense of relief and amelioration only after he has received perhaps two or three or six weeks of treatment. If that patient is being treated on the basis of so much a call and so much a treatment, and he goes on for two weeks without any sensation of feeling better, he will say, "Oh, to hell with this treatment. I am not getting any better and I won't go back to that doctor. I will go get another doctor."

It is my belief, based on snap judgment and no serious consideration of the subject, that the only way to treat a chronic disease is on a flat rate basis. The young fellow just out of school hasn't any basis on which to do that, but I don't believe there is a physician here who has not had enough experience in the management of disease, to form, after he has made a careful clinical and laboratory examination of his patient, a reasonable judgment of how much time and how much ef-

fort is going to be required to give that patient all the benefit which he is capable of receiving. I believe that the physician should make a flat rate for the treatment of that case and collect his fee in advance. Then he can say to that patient: "I will for \$5 (or for \$1,000, or whatever it is), treat you until you are satisfied." Now that patient, instead of at the end of a couple of weeks quitting and going to another doctor, will come back just as often as the doctor says, because every time he comes back he is getting more for the money he has paid.

This is applicable in private practice, and in my opinion it is applicable to a very considerable extent in hospital practice.

I want to urge that seriously upon your consideration. Experiment with it, try it, and find out if it doesn't work.

PRESIDENT TITUS: The only trouble as far as that goes with hospitals is that we have nothing to do with finances and the hospital makes a charge per visit. That is a very nice scheme in private practice and I have been able to do it a few times.

Dr. Lake: For staff men, but not for the hospital or clinic.

President Titus: You have to figure upon your income from the clinics. But when you are a director you have many financial responsibilities imposed upon you and they debit everything they can against your department, and no matter what your income is they are never satisfied that you are doing what you should. In our department people get checks when they come down and we do not know how much they pay. That is all determined upstairs. At the entrance they get a check good for a treatment. Whether they get it, for nothing or ten cents or twenty-five cents or two dollars or three dollars, we don't know. We do know about the \$5 patients because they come at a different time. The charges are made by the hospital and I don't think you could convince the hospital that they could make a flat rate.

Dr. Lake: Oh, no, that is not equitable.

President Titus: That would be the place where it could not work.

President Titus: Will Professor Bachem now present a short exposition on the teach-

ing of the atlas charts on physical therapy that has been written by him and Dr. Kobak?

Dr. Albert Bachem (University of Illinois): I shall show you these charts in the form of lantern slides. The charts are large enough for hospital and for office use and for small lecture rooms, but not for a large auditorium like this.

These charts were particularly planned for purposes of teaching and for demonstration; for teaching physiotherapy or for demonstrating or explaining details to technicians and nurses. It was intended to give aid to the busy practitioners or specialists who are interested in physical therapy, in the form of a graphic and epitomized atlas. It covers the entire range of electro-radiant energy.

Another reason for making these charts was to select the material which was of greatest interest or of direct practical usefulness to the practitioner in his laboratory work. Each one of these charts attempts to illustrate a certain portion of the theory and practice of physical therapy in detail. The first chart presents the Biophysical Foundation of physical therapy. All of the principles and laws utilized in its discipline are considered in their proper division.

Each chart is 30x40 inches in size and can be hung on a convenient wall. All of the basic facts about low frequency currents are incorporated in a single chart. It includes the physics, physiology, therapeutics, indications and special suggestion for guidance to the practitioner. High frequency currents (medical and surgical) have been developed on a similar plan. Special consideration was devoted to the exposition of heat, light and ultraviolet therapy by way of special graphs and charts, in order to emphasize the relative values of each more strongly. Radium and x-rays occupy special divisions in therapeutics, and each one is separately treated in a similar manner. It has been our intention to bring to this publication a clear visualization of the usefulness of each agency, to place before the mind of the student a means for quick appreciation of the values of each department of physical therapy and to bring forth in a concentrated and epitomized form the essential facts of the various branches of Physical Therapy. (Discussion was further continued by aid of lantern slides).

ACCURACY IN THE MEASUREMENT OF X-RAY AND RADIUM DOSES

BY U. V. PORTMANN, M.D.

CLEVELAND CLINIC

CLEVELAND, OHIO

After many years of research and extensive experience in the therapeutic application of the roentgen ray and of radium, an agreement as to the method of measuring roentgen ray dosage has at last been reached. At the International Congress of Radiology in Stockholm last year, the advocated unit of dosage was named the "R-unit."

It has long been known that the older methods of measuring roentgen ray dosage were not satisfactory since there is so much variation in the output of different types of apparatus, as well as in the output of an individual apparatus, even under apparently the same mechanical conditions. We have learned by experience that we can not accurately express dosage in terms of the factors of voltage, amperage, filter and time alone, as they have been employed in the past, nor can we duplicate the dosage that others have secured even when these factors are known. It now becomes necessary for every one using roentgen therapy to express dosage in terms of the international R-unit, and to employ some method for the measurement of dosage.

At present, the most accurate method for measuring roentgen rays and radium intensities is the employment of that physical property of the rays known as ionization. By ionization is meant the splitting up of a molecule of gas so that it is electrically unstable, and carries free, uncombined charges of positive and negative ions. Such a splitting up of molecules occurs when the rays pass through any gas. If a charge of a higher potential is near the liberated ions, they may be attracted to it.

We can make an instrument for measuring radiation intensities by adopting the ionizing property of the rays and using an ordinary gold-leaf electroscope which may be charged to a high potential, so that when rays are passed through it the air therein will become ionized. The liberated ions are then attracted to the charge upon the gold leaf, and thus the electroscope is discharged at a rate propor-

tional to the degree of ionization, or to the intensity of the radiation which has been employed. Since it is difficult to read and to time the rate of fall of the gold-leaf when the electroscope itself is in the field of radiation, we may make use of an attachment called an ionization chamber. From the gold leaf of the electroscope a properly insulated wire leads to a closed chamber which contains air or some other gas. If the rays are then directed into this ionization chamber the gas in the chamber will be ionized. The electroscope and connecting wire being charged, the ions will discharge the electroscope, and the rate of fall of the leaf can be timed, this, of course, varying with the intensity of radiation.

In the application of this method of measuring radiation intensity, several precautions must be observed: (1) the material of which the chamber is constructed is very important; (2) the insulation of the entire system must be perfect; (3) the apparatus must be charged sufficiently. The material of the chamber is important because under the influence of x-rays or radium rays, all matter not only gives off a characteristic and scattered radiation but also absorbs much of the radiation. This characteristic radiation and absorptive power of matter may either increase or decrease the intensity of the focal radiation from the tube. In order to overcome this difficulty, Dr. Fricke and Dr. Glasser developed in our physics research laboratory a small chamber of a material which has almost exactly the same absorptive power as air—a theoretically ideal chamber.

The necessity for insulation of the entire system against electrical leaks is obvious, and, of course, the system must be charged to a potential, high enough to attract the liberated ions before they recombine.

The intensity varies with the quality of the radiation; the quality of the radiation or the wave length is governed by the voltage and filter which are employed. Voltmeters and sphere gaps are inaccurate methods for measuring voltage. The spectograph supplies the most accurate method for the determination

* Read before the Eighth Annual Meeting of American Congress of Physical Therapy, Chicago, November, 1929.

of quality. In order to determine the output of an x-ray apparatus, it is necessary to measure the intensity and the quality of radiation that it produces. If the quality and intensity of the radiation are known, and if they are constant, then the dosage may be repeated accurately.

The measurement of roentgen ray dosage is no longer a difficult or complicated procedure. There are various types of dosimeters on the market, most of them of European manufacture. Every installation for roentgen therapy should be calibrated and should be standardized at stated periods, or a dosimeter should be employed. The intensity output should be determined in R-units and the quality should be defined for each of the various techniques for treatment which are usually used in a particular laboratory. Whenever any mechanical change in installation is made, recalibration is necessary, especially in the case of machines which use rotary disc rectifiers, because a very slight turn of the disc may cause the intensity to vary greatly. This recalibration is especially necessary when soft or intermediate qualities of radiation are used, as in dermatology, or when tubes are changed, because there is great variation in the output of different tubes under these conditions.

Although the calibration of any installation by an experienced physicist is desirable and even necessary, such a calibration does not give an absolute determination in R-units of the dosage which is administered to the patient, not only because of possible variations in the output of the apparatus, but also because of the variation in those factors which influence back-scattering, such as the size and shape of the field and the volume of tissue which is irradiated. Unquestionably, the most satisfactory method of determining roentgen ray dosage is by means of an instrument which may be applied directly to the skin of the patient within the field of radiation. In this way, the radiation from the tube, as well as the back-scattering, may be measured independently of the voltage, distance, amperage, filter, size and shape of the field, and the volume of radiated tissue. It is impossible to calculate by any mathematical formula the exact dosage which is applied.

After a number of years of investigation in our laboratory, we have developed an instrument which measures accurately the dosage

during the time of treatment and may be placed on the patient in the field of radiation. This instrument is equipped with a small ionization chamber, connected with an electrometer. It is necessary that this small ionization chamber, which is applied in the field of radiation, be constructed of a material which has the same absorption to radiation as air itself, from which there is no scattered radiation, and which is independent of the wave length employed in treatment. This ionization chamber which we call the Fricke-Glasser chamber, or air-wall type, has been in use for several years in our Research and Therapy Departments, and has been found to be entirely satisfactory if the materials from which it is constructed are absolutely pure. On account of the very limited amount of current produced in using small ionization chambers, it is necessary either to use a very sensitive measuring device such as an electrometer (electroscope) or to amplify the current so that a less sensitive galvanometer may be employed. The latter method is a complicated procedure requiring elaborate and sensitive apparatus, and is not necessary.

We believe that the roentgen dosimeter of choice is one which consists of a string electrometer with a static charging device, and an electroscope connected by properly insulated wire with an electrode which terminates within an ionization chamber of the Fricke-Glasser, or air-wall type. This dosimeter may be equipped with an ionization chamber of standard volume so that it will produce an ionization current so small that the total dose for the time necessary to give a complete treatment may be registered.

Another type of dosimeter which may be employed when using hard radiation with a particular therapy apparatus or for checking the constancy of output, consists of a large ionization chamber with multiple plate electrodes. A sensitive galvanometer may be used to measure the current produced, which will be in proportion to the size of the ionization chamber. This apparatus will indicate the dosage which is being given during a specified time, and it will act as a check on the constancy of output of an apparatus, but it can not be used for the soft types of radiation since the ionization chamber itself absorbs so much. The chamber is usually placed within a tube container or directly under the filters and it registers only the focal radiation. Due

allowance must be made, therefore, for those factors which influence back-scattering. Probably the ideal arrangement would be a large ionization chamber connected with a galvanometer to control the constancy of output during treatment, and a small chamber connected with an electrometer apparatus for the measurement of the dose which is being administered to the patient.

Any type of dosimeter must be standardized in the terms of the international R-unit, and periodic checks must be made in order to be certain of the constancy of the instrument.

The practitioner need not necessarily be familiar with the method of operation of a large standard air ionization chamber since this comparison can be made only in a central laboratory equipped for this purpose. The Bureau of Standards is now developing a department for the calibration of dosimeters. After a dosimeter has once been calibrated, it may be checked satisfactorily in the therapy laboratory by means of a radio-active standard.

The radio-active standard control may consist of any convenient radium preparation, or any radio-active compound. Of course, the same standard must be used for each calibration. Checking a dosimeter is a very simple procedure since all that is necessary is to place the radio-active control preparation at the place provided for it on the electrometer or the ionization chamber, and to read from the scale the rate of discharge. If there is any variation between this reading and the original rate of discharge, the instrument must be investigated for defects.

Dosimeters must be calibrated in the terms of the R-unit since this is the only physical unit which satisfactorily defines the dose on a physical basis. The R-unit may be defined simply as that amount of radiant energy which, under certain atmospheric conditions, will produce an ionization current that will equal an electrostatic unit. The electrostatic unit is well known and accepted internationally for the measurement of such currents, and is, therefore, applicable in the measurement of currents which are produced by the ionizing effect of the rays. The special conditions which are necessary to determine this R-unit were laid down by international agreement last year.

In our research laboratory we have developed an instrument by which we believe it is

possible to make a satisfactory comparison of the intensities of roentgen rays and of radium radiation in terms of this same physical unit. The instrument, which we call the condenser dosimeter, we first described in the *American Journal of Roentgenology and Radium Therapy* for December, 1928, but is not yet produced commercially. It consists of two sections—a string electrometer or electroscope with a static charging device, and a small condenser in connection with a small ionization chamber of the air-wall type. In operating the instrument, the two sections together are charged by the static charger to a known potential, which is read on the scale of the electrometer. The condenser section may be removed to any distance, where the ionization chamber may be exposed to radium or roentgen rays for a specified time. Under the ionizing influence of the radiation, the condenser becomes discharged, the length of time necessary for this discharge depending upon the intensity of the radiation and the period of exposure. This second section is then reattached to the electrometer and the amount of discharge of the condenser is read directly on the scale of the electrometer. The apparatus is calibrated in R-units in comparison with the large standard ionization chamber.

Previously, the difficulty of comparing the intensity of radiation of radium with that of roentgen rays was due to the fact that whenever radium was placed near a charged electroscope, the radium discharged the electroscope, and it was almost impossible to obtain absolute protection by any amount of lead.

By means of this condenser dosimeter, we are able to remove the condenser section to any distance away from the electroscope, and under any conditions, since it retains its charge very satisfactorily. With this condenser dosimeter it has been found that the threshold erythema dose with radium is apparently about 2000 R-units. The dose with very hard roentgen rays for the same type of erythema, when back-scattering is included, is 1000 R-units. This difference between the biological effects of roentgen rays and of radium is to be expected, since radium emits many shorter wave lengths which are more penetrating than roentgen rays and have less effect upon the skin.

In order to understand the biological effects of radiation, it is necessary to employ accurately measured quantities and qualities as a

basis for making comparisons. We know that our older methods of expressing these factors were inaccurate. Now that we have reliable physical data and satisfactory instruments for making measurements of quantity and quality, we may expect to increase our knowledge of biological reactions to radiation, with resultant greater safety and accuracy in therapy.

After we have had more experience from which to make comparisons of reactions and results, and after researches based upon a better physical foundation, we shall expect to find that in dealing with a particular type or grade of neoplastic tissue, it is necessary to use a certain predetermined dosage to produce the desired effect. With accurate knowledge of the extent and type of the disease, the volume of tissue involved, and the depth of the lesion, this measured dose may then be administered in a proper combination of roentgen and radium rays. Thus radiation therapy will become accurate and efficient.

Discussion

DR. TYLER (Omaha, Nebr.): I have learned that in treatment with high voltage x-ray we need to be very careful in the measurement of our dosage, and I have followed for a considerable period of time an accurate estimation of dosage in each individual patient. I have had my machines calibrated, and I appreciate the value of this work. I will leave the technical discussion to Dr. Bachem, who will follow me.

DR. ALBERT BACHEM (University of Illinois): I have enjoyed listening to a paper that was perfect from the physical point of view. I have nothing to suggest to the technical phase of these studies. As a physicist, I appreciate the method as worked out by Fricke and Glasser. It is the ideal method. It combines the accuracy of the electroscope measurement with the convenience of the small chamber method. Generally, the electroscope in the past gave the more accurate readings, but one could not use it for everything. Such a small chamber can be placed on the skin of the patient or in a body cavity. With this instrument it seems to me that we are able to do finer work, that we have the best accuracy and the best chance of using the instrument.

I should like to ask for the exact name and the company that builds the instrument.

As to the method of determining dosage by formulas or exact measurement by instruments, either direct or indirect method, either by formula or standardized apparatus, I heartily agree with Dr. Portman. I had the chance on Monday morning, in my x-ray lecture, to explain my standpoint, and I should like to repeat it here and to say that a formula is the simpler thing to use but it cannot give any accuracy; it just makes use of the main factors, like potential, amperage and focusing distance, and so forth, but it does not take care of

all the points that come in by the rectifier and the transformer and the size of the portal that we apply, and so on and so on. Dr. Portman has mentioned this in his studies and it would only be time consuming to repeat them.

I think the best way is exact standardization.

Dr. Portman is correct when he says that the greater variations of current in skin therapy is effective on account of tube differences. Everyone knows that perhaps one tube with a little thicker glass or a different coating of the glass or with a different target gives a different output. With deep therapy, we have to be much more careful. There is a smaller margin of safety to the patient. We are treating much larger areas and much larger volumes. In deep therapy, more standardization work is done. In deep therapy we also give more massive and stronger doses, while in dermatology we give smaller doses and more fractional methods are used.

Dr. Portman is very fortunate in having a famous biophysicist at his disposal in the radiological department, and he is in close collaboration with him. Not every doctor is so fortunate, and I should like to ask Dr. Portman's view as to what he thinks the deep therapist should do who has not the opportunity of working in such close cooperation with a physicist; whether he thinks the formula is accurate enough for preliminary work, everything else working out by biological or clinical experience, or whether he thinks the average practitioner is familiar enough with those new instruments that have been put on the market, or whether the physicist should undertake the exact standardization.

There is nothing else to be mentioned on the technique, simply because everything was accurate and covered the point.

DR. RAISON (United States Navy): There is no question but that the roentgen unit is the most scientific unit that has been devised for x-ray therapy. The question is, is it a practical unit for the average practicing roentgen therapist? That, I am not sure of. There are several inherent fallacies in the roentgen unit. I know that this is a heresy to the general belief. In the first place, the roentgen unit must be dependent on the effective wave length, because different kilo-voltage peaks will cause a discharge of your electroscope in practically the same time, whether filtered or unfiltered rays are used. Another thing, all these instruments are calibrated (and I had one of the same instruments that Dr. Portman showed on the screen) by the manufacturer. The Bureau of Standards will not undertake to calibrate these instruments at the present time. They are calibrated by comparison with other ionometers and other instruments and with radium. To secure an accurate calibration of the instrument with radium, one gram of radium is used. Benchen and Solomon, I think, insisted on this. Benchen was here a year ago, I think, to check up his results with Dr. Glasser. They were found to be in practical unison.

Dr. Glasser also checked a Wolf ionometer in the Naval Supply Depot at Brooklyn. We use this as a standard check for the instruments that are purchased for the Navy's use and the comparison is not always accurate; in other words, either the Wolf ionometer is off or the other instrument is

off. The small chamber is $1/20$ c.c., or is claimed to be; it varies slightly; therefore, it shows a margin of error. The scale on the instrument is so small that a magnifying glass has to be used to make it perceptible. The system is rigid; it is hard to put a patient underneath it and take him out from underneath the tube. The scale is graduated, as I recall it, 1 to 1000 in 100 unit divisions, with smaller subdivisions, on the twentieth c.c. chamber. Any electroscope rate of discharge depends upon the amount of charge; therefore, the scale of divisions at one end necessarily must be longer than at the other end. It is not a straight line function. The scale from 0 to 100 will not agree with the scale from 900 to 1000, and the scale from 200 to 300 will not agree with the scale from 600 to 700. As an integrated amount, yes; it is fairly accurate, but not for divided doses. The large chamber and the small chamber should agree absolutely. The large chamber is 1 c.c., but, as I say, it is almost impossible to absolutely calibrate the small chamber so that you get absolute comparison. You will get comparative results.

There are no two x-ray men who are doing considerable amount of roentgen therapy in this country that are agreed exactly on what the R-unit dose is. Everyone uses a slightly different amount.

This is because they have different machines. Different machines have different characteristics in the amount of R-unit produced. However, after you have standardized your machine, the R-unit and your dosimeter are most extremely useful. Without that calibration (it needs a physicist to calibrate) I do not think it is a practical instrument for the average practitioner practicing roentgen therapy.

DR. U. V. PORTMAN: I wish to thank the gentlemen for their very liberal discussions. That discussion from a physicist is especially appreciated because usually as a clinician I have to quarrel with them.

The people who are putting out this particular instrument that I am using, are the Victorene Instrument Company. The instrument is expensive, and I am not sure that they are going to carry out the manufacture of it very much longer. There are several instruments made in Europe which are perfectly satisfactory when once calibrated.

Of course, the physicist likes to give the clinician formulae to work with, but I never yet have seen a doctor who could multiply or divide. I cannot divide or subtract exactly, and there is no formula which will give you the exact dosage at any time. The question is, what is the general therapist to do? I find that I can turn this little crank on my instrument, having put the ionization chamber on the patient, and be perfectly happy that I can read with a stop watch the length of time that it takes the fiber to cross from one end of the scale to the other, and that gives me a thousand R-units. I call a thousand R-units an erythema dose. Maybe the United States Navy will say 1500 R-units.

The redness of the skin that I like comes at 1000 R-units. Maybe the redness that someone else likes comes at 900 R-units. The question comes back to what is an erythema dose? It doesn't mean a thing as far as the lesion that you are treating is

concerned; it only means the self-defense of the skin itself.

The R-unit is at the present time the best thing we have. From a physical standpoint it may not be entirely satisfactory. There may be objections to it, and probably are, but at the present time there is international agreement that the best unit to use for the measurement of roentgen ray is the R-unit. We have to have a volt and we have to have an ampere, and now for the first time we have an R-unit. It is practical for the therapist. One man will treat with his apparatus at 200 kilovolts, we will say, and a half millimeter of copper at a certain number of centimeters' distance, and get the erythema that he likes, and the probability is that that may be 900 or 1000 R-units. The R-unit stands as a measure of dosage just the same; it doesn't matter how you use it.

Of course, quality must be defined, and when you define quality in the terms of wave length it is the same thing as if you were defining quality in the terms of voltage and filter. The only thing is that we say we are using a wave length, so many Angström units or a part of an Angström unit, instead of saying we are using so many kilovolts and a half millimeter of copper because your 200 kilovolts and a half millimeter of copper are not the same as mine, and your 200 kilovolts today are not the same as your 200 kilovolts tomorrow. Your machine may vary five, ten, or fifteen per cent, and we have seen even as high as thirty-five per cent at one time compared with others, that is with a rectified machine.

After an instrument has been calibrated, the doctor raises the point of how that shall be controlled, and that a gram of radium is necessary.

DR. RAISON: I said to get an absolute R-unit the gram of radium is proposed. After the instrument is calibrated you can use the radium standard that is supplied and the Bureau of Standards will give you a check on your radium standard, but I didn't say anything about after-calibration of the machine.

DR. PORTMAN: I thought you meant that amount of radium was necessary. I misunderstood you.

The radium standard is simply used to check your instrument from time to time. When the instrument has once been calibrated in the Bureau of Standards or some central laboratory, you send with that instrument a small amount of radium (it doesn't make any difference how much; you don't even have to have radium, you can use your radium oxid) and they put that on the instrument and find that it discharges over the scale in a certain length of time with that radium standard in place. In two, three or four weeks from now, if you want to see if your instrument is still accurate, you just put your radium standard on the instrument in the same place that they used it and if the discharge time is the same your instrument is all right, and if it isn't the same there is some error, and if it is small you can make a correction for it.

Also, the small ionization chamber which I am using is $1\frac{1}{2}$ c.c. and not $1/20$ c.c. That gives me the dose.

DR. RAISON: Not with the Victorene.

DR. PORTMAN: Yes. But if you use a twentieth c.c. chamber, that is giving you the total dose over

a very much longer period of time. It is just a question that the size of the chamber means only the length of time under which you are giving the treatment, and is of a perfectly practical size for a chamber. Now they are making those instruments so that the chamber conforms to the sensitivity of the instrument, and the size of the chamber really is adapted for that particular instrument. It may be a $1\frac{1}{2}$, $1\frac{3}{4}$, or 1 c.c., depending upon the sensitivity of the instrument.

DR. RAISON: Aren't they also making a small chamber as well as the large?

DR. PORTMAN: They also make the 1/20 c.c. chamber for giving the total dose.

The scale that I am using does not require even my glasses to read six feet. That is not an objection. You can project the scale any distance you want to without any difficulty whatever. My tube is about the length that you saw here, and there is no particular disadvantage about that.

Of course, the thing does not read the same for each division of the scale, but when you use divided dosage, it is just a question, then, of dividing your time and not a question of reading any particular number of divisions at all.

As I said before, as far as the disagreement be-

tween physicists and clinicians is concerned, as to the practicability of the R-unit, it is not a question of the R-unit at all, but a question of what is an erythema. As soon as we get out of our minds this idea of erythema we will be better off, because erythema means simply reddening of the skin. I admit that some disagree with us, but we have found that the erythema reaction varies with the wave length that you are using. The erythema reaction with a very soft roentgen ray is accomplished at 300 R-units, while with a hard roentgen ray it takes 1000 R-units or 1200 R-units to produce the same redness of the skin, and with intermediate radiation I am using 600 R-units and get exactly the same erythema that I do with hard rays at about 1000. So there is a variation in what is an erythema. We ought to eliminate that, and instead of saying, then, that we gave a person an erythema which to you has a different meaning from what it has to me, we say, "I give 1000 R-units," and we know what we are talking about.

It seems to me that the whole thing is soon to be simplified and it is very much easier, really, for me at least, to turn a crank and read my scale with a stop watch than it is to calculate by complicated formula the dosage which I hope I am administering to the patient.

Plantar Warts. Cyril K. Valade, M.D.

Jour. M. S. M. S., July, 1930.

The treatment for plantar warts may be divided into three methods.

1. Local applications of plasters or pastes containing keratolytic drugs, the most popular one being salicylic acid. Markley's method is the best of this class and is as follows:

He surrounds the area with simple collodion to protect normal tissue from continuous action of drugs. The thickened epidermis is cauterized with fuming nitric acid or strong solution of caustic soda until the callosity has been eaten away to the depth at which patient first complained of pain. The hole formed is filled with a 15 to 20 per cent salicylic acid ointment. This is covered by a felt corn plaster of nearly 3 inches in diameter, having an aperture of about 1 inch. The crater is filled, after scraping the detritus gently away, every morning. It requires 7 to 8 days for cure.

2. The second method is by surgical diathermy. You can use either the monopolar or bipolar electrode. Some like the indirect method, that is, having the patient hold the electrode, then use a pencil or applicator for directing the spark from the patient. The surgical diathermy procedure is practically painless if the operator has injected a local anesthetic skillfully (we have found 2 per cent novocaine combined with a solution of adrenalin very satisfactory for this type of local anesthesia).

3. The third method is by radiation. The chief objection to methods one and two is the constant

danger of infection. The location of plantar warts is very favorable for infection after any surgical procedure if the patient is permitted to go about his daily activities. If the patient can be put to bed, why of course this danger is practically eliminated. X-ray therapy for plantar warts is perfectly safe at the hands of an operator who is trained in roentgenology. The procedure is simple. The surrounding skin is screened to the edge of the lesion with the usual lead-rubber screen. Place target at right angle to wart at the required distance for whatever dosage is required, then run the machine for the necessary time interval. The unfiltered dose is used. For the exact technic for measuring x-ray doses we refer you to MacKee's book "X-rays and Radium in the Treatment of Diseases of the Skin." The dose necessary for the average wart is one and one-half skin units (MacKee's designation). This depends of course upon the amount of callosity present. If there is much horny tissue it may require two or more skin units of x-ray at one dose. If the wart has not disappeared by four weeks it is safe to give another treatment. If this is insufficient it is better to apply method number two. It is very satisfying to report that failures in the use of x-rays are few.

Radium also has been used with about the same results experienced with x-rays. The flat application is the most popular method of applying radium. A half strength flat glazed element application screened with 0.1 mm. aluminum, in contact with wart for 15 to 30 minutes or even longer if there is much keratosis.

PHYSIOTHERAPY IN RELATION TO SURGERY *

R. J. BEHAN, M. D.

PITTSBURGH, PA.

Many years ago, while a student in the European Clinics, I became convinced of the value of physiotherapy as an adjunct in treatment in every department and specialty of medicine. In the great St. Georg Hospital, in Hamburg, I saw exemplified for the first time the water immersion treatment of burns and of all extensive open infected wounds. The patients were placed in large bath tubs in which water, of an equable temperature, was kept constantly circulating, and it was surprising to note the great benefit which these patients received from this type of treatment. In the large Clinics of Berlin, especially the first surgical clinic in which in 1912-1913 I happened to have been an assistant, and which was under the able supervision of Prof. August Bier, physical methods of treatment were greatly favored for chronic inflammatory lesions, such as bone tuberculosis, osteomyelitis, etc. It was in this clinic that Prof. Klapp's methods of functional over-correction of scoliosis of the spine were first instituted. Daily, I observed 100 to 150 young children going through exercises which by muscular counter-pull corrected vertebral deformities. It was in Bier's Clinic, as you know, that the principle of hyperemia as a therapeutic measure in the treatment of inflammatory and chronic affections of a part was first introduced. (This method today does not, unfortunately, receive the attention which it merits.) From Prof. Bier's Clinic one could take a train to Vienna and enter the surgical clinics of Prof. Eiselsberg. At that time, in 1912, Eiselsberg was sending most of his tubercular surgical affections to the clinics of Prof. Rollier in Switzerland for heliotherapy. In 1913, there were in Germany immense sanatoria for physical methods of therapy. A well equipped model of its kind was the large sanatorium at Semmerung in the neighborhood of Vienna. In Berlin, I also noticed in the associated departments of the Virchow Krankenhaus, the Moabit Hospital and in the great Hospital at Haidenhein the remarkable corrective influence of physical methods

of therapy, especially the influence which diathermy had upon chronic inflammatory lesions.

Impressed with the great interest that foreign clinicians had towards physical methods of treatment in chronic diseases, and noting the improvement in their patients under these different methods, it was only natural that I should be convinced of the benefit derived and should attempt to apply, when possible, these therapeutic measures in the treatment of my own patients. In all the intervening years, from the time of my student days in Europe to the present time I have never lost sight of, nor have I doubted the benefits to be derived from such treatment.

In 1912 we, in this country, were very backward in our application of physical therapeutic measures. However, this was not universal, for well do I remember the great hall at the Massachusetts General Hospital where the Zander method of treatment of joint, bone and muscle defects was applied. When I resumed the practice of surgery on my return from Europe, in 1914, there was not an accredited physician in the city of Pittsburgh who limited himself to the practice of this division of therapeutics. It has been only recently that such specialists in treatment have separated themselves from the body of the profession.

Under these conditions I found it necessary in a very modest manner to include diathermy in my practice. In 1914, I bought a high frequency machine and found it of value in chronic affections, especially those of bone and particularly of joints. I am still a faithful advocate of its use in these conditions. I have also noted the benefit to be derived from diathermy in many chronic intra-abdominal lesions of a mild inflammatory type. My observation in the Army, where physiotherapy was given such acclaim and which produced such remarkable results, thoroughly convinced me of the efficacy of physical modalities as adjuvants in surgical interventions. In 1926 I equipped my office with a physiotherapeutic laboratory. At the present time I

*Read at the eighth annual meeting of the American Congress of Physical Therapy, Chicago, November, 1928.

have a nurse and an office assistant, two girls who are trained to apply various physical modalities. With the assistance of these two aides and a young physician who is in my office, we have obtained fairly good results, and I am well pleased with the innovation which I have made.

As my knowledge of physiotherapy is not universal I shall limit my discussion to those phases with which I am familiar. I am not familiar with the different hydro-therapeutic measures which I believe to be of great value in the treatment of disease but of which, unfortunately, I am not able to avail myself under the conditions which exist in my practice.

Preoperative Adjuvants

With the background which I have given you, I shall now try to explain how and in what manner I have found physical therapy measures of aid to me in surgical work. I shall first consider the patient who is to be operated. Irrespective of the character or the type of operation, it is the object of every surgeon to bring his patient to the operating table in the best possible condition, so that he may be resistant to a maximum degree to the shock, interference, and physical disturbance which the operation entails. This is especially so in those who are weak and debilitated by a long period of severe illness. Such cases should be earnestly considered and should not be operated upon until conditions are favorable to them, or as favorable as is humanly possible. If the operation is not imperative, patients should be placed in a suitable location and in environment where they will have a maximum of sunlight, good fresh air, quiet and rest. As it is not always possible to bring patients into ideal surroundings, it then behooves us to develop resistant processes in those who remain at home under our personal supervision. They should have their physical well-being developed to the highest possible degree. Of all the factors which produce improved tone, increase resistance, better mental reaction, none, I believe, have greater value than ultraviolet light. I can recommend it most enthusiastically as a preliminary treatment for the weak and anaemic on whom we consider it necessary to impose an operation. In my hands, ultraviolet, both as a pre-operative and post-operative measure of treatment, has proved of great benefit. It acts both as a sedative and an

energizing agent. Six weeks or more of treatment may be so conducted that the patient's energy is improved. Rest, baths and massage are all of great value. Anaemia should be corrected by methods which are available. If urgency demands, transfusion should be done. Colonic irrigation has proven of some benefit in cases where there is a low grade intoxication, the cause of which cannot always be determined. At least, under its use, patients report to me that they feel much improved, and I have noticed, personally, that they look better, are more active and seem to have more energy. As a measure of therapy I believe it has some value.

Physical Adjuvants During Operation

I have had no experience with the method of Crile by which, during operation, he claims to decrease the incidence of shock to the patient by passing a high frequency current through the liver, thereby raising the temperature. Perhaps this may be of value, but from a theoretical standpoint, to my mind, it is not ideal. It is, of course, necessary, during an operation, to keep the patient from losing heat, but in a series of 22 operations where rectal temperature curves were plotted, I found that under ether anesthesia there was a constant but slight elevation of temperature.

I find that the physical measures which may be considered as applicable at the time of operation are those modifications of the high frequency current by which fulguration, desiccation and acusection can be performed. It is a great boon to the surgeon to be able to destroy tissue *in situ* by means of coagulation or dessication, or to remove neoplasms and other growths by means of the sharp cutting current. I have made many incisions through the abdominal wall by the endotherm knife. At times I used it with considerable apprehension and perhaps was unjustly fearful of non-union or extensive necrosis. In some cases where the bowel was attached to the under surface of the abdominal wall I thought that I might, on making the incision, penetrate into the bowel. All these fears were groundless.

The control of bleeding vessels by coagulation of the vessel wall does away with the ligatures. Of all the advancements in the technic of surgery in the last decade, it seems to me that this because of its unique and useful character, is the most valuable.

Post-Operative Treatment

In the post-operative treatment of surgical cases, those in which abdominal adhesions have been present and in which we apprehend a recurrence of adhesions after operation, peristalsis is stimulated by diathermy. I believe diathermy is of value here in retarding the formation of the intraabdominal adhesions. Immediately after operation, injection of eserine salicylate and pituitin is given in association with diathermy. A pad, moistened with sterile 10 per cent salt solution, is placed over the abdomen with the counter electrode over the back. Low amperage is applied for at least one hour. If we are inquisitive we can definitely determine that there is an increase of peristalsis, by listening through a stethoscope, the bell of which is placed on the abdominal wall. The patient feels markedly benefited by this treatment.

In all our therapeutic measures we should remember that nature is extremely beneficent in her endeavor to induce conditions favorable for healing, and we should attempt to imitate and support her, never to supplant her. In all the lesions in which healing takes place there is a hyperemia and increased circulation. In consequence, accumulation of corrective factors and reconstructive agents associated with an increment of nutritive element occurs. In physiotherapy there are two agents which can bring about these results. First, ultraviolet radiation which is obtained directly from the sun or by artificial means from carbon arc or mercury lamps. The manner in which ultraviolet light acts on a part has been the subject of considerable controversy. However, I believe that we can say without fear of contradiction that one effect of this application is the hyperemia produced directly in the part under treatment. This hyperemia may be the result of the heat from the lamp or may be the effect directly from the action of radiant energy on the sympathetic nervous system, so that the vessels of the part under treatment are dilated. Ultraviolet radiation also has a peculiar tendency to cause an increase of calcium in the blood. Calcium, as you know, acts upon the sympathetic nervous system, produces dilatation of the vessels and seems to be specially localized to any pathologic process taking place in the body. The ultraviolet light also stimulates the formation of red blood cells. It increases the alkalinity

of the tissue juices which is a valuable factor in many conditions.

Massage should not be neglected as a post-operative routine. After abdominal operations, it should be applied very carefully over the abdomen. As a general stimulating agent it is of considerable value. A nurse in a doctor's office can apply it very beneficially. Mild degrees of exercise should be instituted very early. An ideal method would be to have patients who are able begin some well planned resistant movements shortly after operation. I have not applied massage as a routine, but I believe it to be of great value. Good results, undoubtedly, are to be obtained from its use. Massage may be combined with other measures when it is intended that the circulation of the part should be stimulated or mobilization of tissues should take place. After fractures, massage is of very great benefit.

Radiant light has given good results. Where operative interference has induced an induration of tissue, perhaps as the result of trauma or of hemorrhage, and in lesions due to a type of organism which does not produce definite suppuration. Heat is also of great value in the treatment of burns, after application of tannic acid (5 per cent). The burned surface is exposed to the air with a hood over the part. In the hood the heat is maintained at a temperature of 80° F. by electric bulbs.

Keloids

In certain individuals, after trauma, either operative or accidental, there is a rapid proliferative growth of scar tissue, which is termed a keloid. These keloids in the course of their rapid growth may become very painful. With direct application of a Kromayer lamp, keloids are not only controlled but the pain disappears and the tissue becomes soft and pliable. In every patient, ultraviolet light should be applied as soon as a tendency for keloid formation in a scar is noticeable.

In an abdominal post-operative patient there is nothing which arouses more anxiety than do hiccoughs. It is, in many instances, the label for sepsis and the forerunner of death. After basic causitive agents have been removed, as much as it is possible, the spasmodic contractions of the diaphragm may persist and cause complete exhaustion. Every surgeon of experience encounters such a condition every once in a while, and if he does

not correct it, is aware that death is reaching for his patient.

In Mr. M., an infected foot was incised and a piece of necrotic bone was removed from the end of the third metatarsal. General sepsis developed, hiccoughs started, and could not be controlled. Even phrenocotomy was unsuccessful. The spasms still persisted though lessened in severity. Morphine and narcotics had no effect. The patient, though sleeping, would still continue with his hiccoughs. The only way it could be controlled was by the interrupted galvanic, the positive electrode placed over the epigastrum and the negative electrode on the opposite side of the body. After ten minutes of application with 20 milliamperes dosage the spasms would cease and patient slept quietly. In a few hours they would again start and would cease on application of the galvanic current.

Arthritis

Among the diseases that frequently confront the surgeon, are various forms of arthritis. Heretofore, the surgeon has assumed charge of a patient with arthritis only when the process has become suppurative. If the surgeon is called upon to treat a case of arthritis, he should first determine whether it is *suppurative*. I prefer to refer to a medical clinician all except the static, traumatic, tubercular and suppurative types.

When a surgeon assumes responsibility of a patient with arthritis, he should consider not only the means which heretofore have been used by him, such as splinting, application of ice, or heat to the part, but should also avail himself of the beneficial influences of physiotherapy. He should remember that generalized ultraviolet radiation increases the general resistance in every person and, indirectly, the localized resistance to disease. He should remember, particularly, that all chronic, suppurative processes are improved by penetrative heat, even in those cases in which pus is present, and where it becomes necessary to make an incision to evacuate the pus. The involved joint should be placed at rest. Diathermy and radiant heat can then be used to the best advantage. This method, combining generalized ultraviolet radiation with localized radiant heat and diathermy, is valuable for the relief of symptoms and as a means of bringing the joint back to approximately normal function.

Bier's hyperemia is most useful. At the German Surgical Congress of 1913, I saw Bier demonstrate over one hundred cured tubercular arthritides, with nearly perfect motion in the joint.

Fractures

Diathermy and ultraviolet rays are also to be highly recommended in the treatment of fractures. In these cases one also should not forget that Bier's hyperemia is very definitely indicated.

Diathermy should not be used too early before the callus has begun to form. There is a growing opinion that hyperemia, in the very early stages of a fracture, hinders the repair.

Stimulation by faradic and galvanic currents and massage keep the muscles in a healthy state, so that on resuming activity, they can immediately operate at full capacity.

Saving by use of physical therapy treatments:

	When Treated with		
	Normal Recovery	Physical Therapy	Saving
Clavicle	67 days	59 days	8 days or 12%
Humerus	125 days	90 days	35 days or 28%
Radius—			
Ulna or both.	76 days	64 days	12 days or 16%
Femur	239 days	180 days	59 days or 25%
Fibula or Tibia	121 days	92 days	29 days or 24%

Dr. Hutchins of the Aetna Life Insurance Company, Syracuse, New York, recently made the following report:

Over a period of 51 months he treated 474 cases at a net saving of \$163,000.00 to the Aetna Life Insurance Company.

A Potts fracture with 60 per cent loss of foot granted was reduced to 25 per cent loss by use of physical therapy. (Courtesy of Dr. R. M. Heath.)

Ulcers

Indolent ulcers on the leg are the bane of every surgeon. He has found them extremely difficult to treat, and even when healed it is very hard to permanently keep them cured. Many of these ulcers are due to the stasis resulting from varicose veins. The removal of these veins will aid and sometimes cure. Varicosities are now usually treated by local intravenous injection of an agent which is destructive to the intima of the vein. However, there are a certain number of these ulcers which do not heal even when the associated varicosities are corrected. There are also a certain number which are not associated definitely with any varicosity. In these, one should seek for a diabetic or syphilitic basis

and, especially, should the blood sugar be estimated.

There is a further group of which the causative factor is extremely difficult to determine. This group, in which ulcers are indolent, do not have a red, granulating base but a grayish floor. The edge is not abrupt or elevated but seems to slope gradually towards the base of the ulcer. Epithelium, as is known, will not heal unless there is granulation tissue, over which it grows. As these ulcers do not have granulation tissue at the base, it is necessary to stimulate formation of this tissue by irritation with silver nitrate or with the cautery. It is also necessary to keep the circulation of the limb to a high degree of efficiency. The ultraviolet light, the radiant light or diathermy is of considerable value. In one case I have applied the galvanic current with the idea that it would produce a relaxation of the vessels in this area. The current was directed both in a transverse and a longitudinal direction across the ulcer. Marked improvement took place following a series of these treatments.

Tubercular Glands

Until recently, tubercular glands were absolutely in the province of the surgeon. I, as well as many others, have removed numbers of them, especially the cervical glands of the neck. If conservative, we have subjected our patients to repeated operations in the same area, or if radical, have made a very wide excision with a noticeably disfiguring scar. In the last five years I have not operated upon a single tubercular gland of the neck. If the gland is broken down I have aspirated the liquid contents through a needle. I find that it is not necessary to incise these glands and that they recover without scar, without deformity and without the induction of additional drainage. When these glands are operated, it happens too often that the surgeon scatters the tubercular material so that he directly is the means of extending the process further along the lymphatic chain. As a means of keeping up the nourishment of the patient to a high level, cod-liver oil, iodides, good food and plenty of rest should not be neglected.

Pelvic Cellulitis

A further field which has been pre-empted from the surgeon to a considerable extent is that of pelvic cellulitis. I can well remember

the time when every patient with pelvic cellulitis, beyond the acute stage, was considered a legitimate case for myself and associates. I was very much surprised, in 1926, while attending the gynecological clinics in Vienna, at the few operations performed for pelvic infections. In one whole month I did not see one case of pelvic cellulitis operated. The personnel of the clinic informed me that pelvic cellulitis was treated entirely by hot mud baths and diathermy. The patient enters the mud baths and stays in them for a considerable period. Diathermy was used according to the technic which is customary. Every one of these patients that I saw was doing well under this form of treatment. Each patient was also given protein therapy. In the past four years I have closely followed this plan. I found that in a few cases I had to operate to remove an infected tube. By removal of the tube or tubes, if both are involved, I have been able to accomplish good results. This does not occur so very frequently and I operate only when importuned by the patient who does not have the time nor the inclination nor the means to continue treatment over a long period. I believe that cure would follow in 90 to 95 per cent of all cases should the treatment be sufficiently persistent.

Diathermy produces severe pain in inflammatory lesions of the pelvis and is of value in diagnosing pelvic cellulitis and salpingitis from extra uterine pregnancy, adhesions, etc.

I have found the direct application of the Kromayer quartz rod of very great benefit in the healing of cervical ulcerations and in the cure of discharges, non-gonorrhreal in character, which apparently have their origin in the endo-cervix.

Conclusion

I believe every surgeon should know at least the basic principles of its application — and the conditions in which physical measures are indicated. I have not attempted an encyclopedic review but have illustrated how physical therapy may be of value to a surgeon.

Discussion

DR. A. D. WILLMOTH (Louisville, Ky.): If I understood the essayist correctly, he stated that diathermy was an important agent to differentiate in the diagnosis of ectopic gestations and acute cellulitis. I don't know just how he applies his treatments or his diagnostic energy, but personally I think I should be afraid to use much diathermy

about a woman's pelvis that I thought had an ectopic gestation or pelvic cellulitis. I don't think there would be much difference in shooting off a double barreled gun to see which barrel had the load in it.

Well do I recall in my own work a case of a chiropractor whose wife had a pain in her abdomen and who had applied diathermy very frequently and very energetically to her abdomen for some three or four days. At the time that I saw this woman I didn't think there was any question about the case; it seemed to me to be a very clear case of ectopic gestation. I opened her abdomen and removed about a half gallon of blood out of it.

I would be afraid, personally, to use it as a diagnostic means. I am afraid to use diathermy about any acute pelvic conditions, or one that I suspect as being acute.

I know of a case recently, in the hands of a doctor who applied diathermy, and the woman promptly died with an acute infection that he believes himself he fanned into activity with diathermy to her pelvis.

I should like to have the doctor just briefly state to us how he uses it and still stays on the side of safety as a diagnostic measure for ectopic gestation and pelvic cellulitis.

There is no question that physical energies have helped a great deal in surgery. I don't operate on my gall bladder cases as I used to. I feel that I can get many cures in the gall bladder cases by various physical energies, particularly diathermy to the liver. If you can stimulate the gland ten per cent by one degree of heat, you certainly can do something toward relieving these patients. For the past ten years I have been able to relieve these patients without much surgery. The same is true in gynecology. What a wide field we have there for the relief of many conditions that used to be regarded as strictly surgical!

Again, I want especially to refer to the cases of adenitis that the doctor referred to. Like all other surgeons, I have left a mark on a great many young girls' necks that I should like to get off, if humanly possible now, when we used to make a Z incision and turn the flaps either way and go in after the glands and the entire fascia. You gentlemen remember what a destructive operation it was and how little good you did. In about six months the girl was back with probably more glands than she had when you operated the first time.

In these cases I think you can do a great deal, particularly with x-rays. Here is one of the places

where x-rays will serve you a very valuable purpose. I have in mind right now a splendid young matron who came from a tubercular family. She is living with her husband's people who are tubercular. The suggestion, of course, was very strong that her condition was tubercular, although her family physician raised the question that it might be a Hodgkin's disease.

This case we treated with x-ray with entire satisfaction. Just a few days before leaving Louisville, this young woman was in the office and I observed that the glands had entirely disappeared. What more do you want? What more could you ask? I will say to you that these glands were extensive on the left side particularly, and those have disappeared, all within six months time. That seems to me to be a very strong argument for non-operative interference in these cases of adenitis.

There are many other conditions I think, too, that are amenable to the physical energies. I am one of the surgeons who many years ago specialized in gynecological work. I have learned that I can now favorably influence many gynecological and surgical conditions with physical energies.

I particularly like to talk about the application of diathermy to pelvic infections. I am very cautious in using diathermy on acute pelvic infections, and I should certainly be very conservative in applying it where I suspected tumefactions or malignancies.

In chronic conditions, where all the acute phases have subsided, it can be used. By weeding out certain acute conditions we apply diathermy very frequently and get good results from it.

The application of diathermy to certain abdominal conditions offers a great deal of relief, particularly to gall bladder cases. In post-operative gall bladder conditions, we treat with diathermy. I think it has quite a field of usefulness. I certainly have been very much satisfied in my experience with this remedy in the last few years.

DR. RICHARD J. BEHAN: I did not mean that I tried to diagnose cellulitis with diathermy. If we do have pain and are using diathermy on the abdomen we regard the condition as acute.

In our work with the acusector we have been able to get good primary union, though it is necessary in our work, for instance, to keep the retention sutures in longer than we otherwise would. We always leave our retention sutures in two weeks, sometimes almost three weeks. I find that if they are taken out sooner the skin edges separate. I think you had better leave your sutures in longer than you ordinarily would.



THE MAGIC ULTRAVIOLET*

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The biological reactivity of ultraviolet light is well established even though there still be many confused and little understood factors. While it is probably satisfactory to state that these properties of ultraviolet are its most important, ultraviolet light serves man in many other interesting ways. Some of these are worthy of careful consideration and further study.

Fluorescence—that phenomenon which results in the emission of light by a substance when exposed to ultraviolet rays—has many practical applications. Many of these applications are of importance to the physician.

Ordinarily, the light of fluorescence is considered to be visible light, discernible by the eye. However, substances also fluoresce in wave lengths and frequencies in the ultraviolet and infra-red, as demonstrable by photographic spectroscopy.

The intensity of fluorescence is very low in comparison with that of daylight, or light from a lamp, with the result that it is usually necessary and desirable to view fluorescence in a darkened room and to screen the light by means of suitable filter so that the visible light is excluded but the ultraviolet light which is to excite the fluorescence may pass through. Because of the high cost of apparatus required for visualizing fluorescence in ultraviolet and infra-red frequencies, studies in fluorescence have usually been confined to the visible frequencies, and then to a primitive determination of color and matching of the same. Obviously the determination of a color by eye is dependent to a large measure on the eye of the investigator and will vary with observers. Also, words often fail us when an attempt is made to describe the degree of a particular tint of blue or green. The scientific method for determinations of fluorescence employs photographic spectroscopy, but such apparatus is unavailable to the usual practitioner of therapy. As a result, practically all, if not all, biological fluorescence studies have been made by the eye-color method.

The equipment required for the eye-color method is a darkened room, a filter which transmits ultraviolet but not much, if any, of the visible, and light source rich in ultraviolet. For the latter, the quartz mercury arc appears to be the most suitable and convenient. The human equipment is a good sensitive color reactive pair of eyes and a vivid imagination with descriptive power. Thus equipped, every substance has a message to tell under the ultraviolet.

If normal healthy skin be exposed to ultraviolet rays in a dark room it will appear very dark, the degree of darkness depending in a large measure on the darkness of the room and the purity of the ultraviolet rays. Normal skin fluoresces a dull reddish brown. Blemishes which are not visible in ordinary white visible light are plainly indicated by a difference in fluorescence under ultraviolet. Even a very slight injury, such as results from wearing a wrist watch and which is not discernible in visible light, is plainly indicated. It might be added that in this case, the change in skin fluorescence is not due apparently to any foreign material transposed from the watch strap to the skin.

Nails, live natural teeth, and thickened keratin layers of the palms of the hands and soles of the feet exhibit a pearly white fluorescence.

Diseased skin appears very markedly different than normal healthy skin when viewed under ultraviolet. Dr. Wadsworth of Concord, N. C., has reported on the appearance of the skin in eruptive diseases such as measles and scarlet fever. He found that if the skin of suspects was viewed under ultraviolet an eruption was indicated beneath the epidermis exactly forty-eight hours before it made its appearance macroscopically. In some instances, suspected cases of measles were definitely shown to be incorrectly diagnosed and the findings under ultraviolet were fully substantiated by the subsequent failure of an eruption to develop. Scarlet fever showed under observation with ultraviolet similar eruption a number of hours prior to visibility to eye in ordinary light. There appears little

* Read at the Ninth Annual Meeting of American Congress of Physical Therapy, St. Louis, September, 1930.

doubt but that all eruptive diseases exhibit like characteristics under ultraviolet, hence ultraviolet offers a means of identifying an eruptive disease before the eruption is visible to the eye in ordinary light. This should be a valuable agent in diagnosis of such diseases.

Dr. Goodman, of New York, has made many observations of diseased skin fluorescence, a few of which will be repeated here. *Molluscum contagiosum* does not appear like other keratotic lesions when viewed under the ultraviolet. Instead of the pearly white fluorescence characteristics of keratin, the lesion of molluscum is very dark, only the umbilication being white. Cultures of various tinea from the laboratory disclosed many different tints of fluorescence which should serve as indicative of differences and assist diagnosis.

Dr. Bucky, of New York, demonstrated the ability of ultraviolet light to disclose areas which had been affected by x-ray and radium, although these areas were invisible in ordinary light. Thus ultraviolet may serve as a gauge of x-ray dosage, for the change produced by x-ray is attended by an immediate alteration of the skin appearance as viewed by ultraviolet. Similarly ultraviolet erythema is visible immediately when viewed with ultraviolet light.

The ultraviolet is particularly capable of demonstrating the use and presence of hair tonics, cosmetics and salves which are a frequent cause for skin irritations. All such preparations have their characteristic fluorescence and may with a little experience be identified by this means. Dr. Goodman has cited a number of his experiences such as the following: A fairly aged woman, on examination by her physician, was reported to have an edema of the forearm which was progressively extending to the shoulder. Her arms were examined under ultraviolet at the suggestion of Dr. Goodman who was at that time engaged in examining anything and everything under his new special filter. To the surprise of everyone, and doubtlessly to the delight of Dr. Goodman, the ultraviolet revealed that the supposed edema was due to the fact that an irritating antipruritic was being applied by the woman herself to ever increasing areas of the arms. Elimination of the antipruritic resulted in a speedy and complete cure.

Another property of ultraviolet light, not related to fluorescence is its ability to produce

an erythema. Certain of the ultraviolet rays are responsible for the familiar sunburn and pigmentation which persists to view in visible light for weeks, and under ultraviolet for a year or more. Ultraviolet light thus makes available a means for branding which is being adopted in the maternity ward of some progressive hospitals for purposes of identification.

A great problem in maternity hospitals has been to devise a method which positively identifies the infant. Positive identification is not only necessary in order that mistakes in the mixing of children be avoided but, also, in order that the false claims of a parent be thwarted. These confusions are of very frequent occurrence, and are a continual cause of annoyance to hospital superintendents. Various methods of identification are in use, but mistakes do occur and attempted falsifications are prevalent.

It is a simple matter to produce a sunburn on the baby and the mother, and following the delivery of the infant, the parents initials, or a number which definitely and indisputably is related to the two can be irradiated. These markings persist far longer than the stay in the hospital; and with such a system, disputes and the "scrambling" of babies really becomes impossible.

This method of marking has been in use in the Delaware County Hospital, Philadelphia, and has been developed with considerable care by Dr. Gerstenfeld at the Beth-Israel Hospital in Newark, N. J. and elsewhere, and is finding increasing favor. The indications are that it is destined to become a favorite method for baby identification.

Ultraviolet serves man in many ways in the commercial and industrial world. Its magic touch is present when least suspected. The Broadway Limited or the Twentieth Century speeds safely over steel rails which an obscure laboratory in some steel mill has found to be flawless—by ultraviolet. The patent leather shoes worn for dress are "patent" because ultraviolet light was employed in their preparation.

Many more examples of the astonishing uses of ultraviolet could be cited as indicative of the debt civilization owes to ultraviolet commercially, but the premier application of ultraviolet will always be in the field of therapeutics, for its influence on health is sufficient to assure this position.

**The Comparison of Biological Effectiveness
of the Radiation From a Mercury Va-
pour Lamp and From Two Arc Lamps
as Made by a Screened Photo-
Electric Cell**

By T. C. Angus, A.M.I.E.E.

(From the National Institute for Medical
Research)

These experiments are the result of a request, by an institution which has been using a mercury vapour lamp for the experimental radiation of animals, for definite information as to the comparative power of this lamp with the powers of the arcs used by Dr. Dora Colebrook in her recent experiments on the irradiation of school children.

It is thought that as the lamps concerned are in common use, the results that we have obtained may not be without interest.

The mercury vapour lamp is a new one of the vacuum type by the Hewittic Company. It has a direct-current burner which is operated by a rectified alternating current; the lamp and attachments take about $5\frac{1}{2}$ amperes from 200 volt A.C. mains. The lamp was "run in" by being allowed to burn for twenty-four hours before the comparisons were made.

The arcs were similar to those used in Colebrook's recent experiment¹ and carbons from the same batches used by her were employed. The strongest arc, used at a distance of 26 in. to give the maximum doses in Colebrook's experiment, had 18 mm. carbons: the upper, negative, plain soft cored; the bottom, positive, containing pulverised iron. A direct current of 30 amperes was used with a P.D. across the arc of 70 volts. The weakest arc, used at a distance of 42 in., had a plain top carbon and a positive, bottom "white flame" carbon.

In this experiment the three sources of ultraviolet radiation were compared by means of a cadmium photo-electric cell placed at the same distance in every instance—245 centimetres—this long distance being employed so

that light from all points along the tube of the M.V. lamp might enter the cell. The cell was covered with a thin window of vitaglass to cut out the greater portion of the very short radiations² and so make its readings more nearly a measure of the visible effects produced on the body.

The relative intensities of erythema-producing radiations thus measured are given by the reciprocals of the times taken to discharge the photo-electric cell and its electroscope and were found to compare thus:—

Actual Measurements

Mercury vapour lamp.3.37 Relative Intensities
"B" arc (maximum)...3.54
"A" arc (minimum)...1.00

It has been found that by this method measurements of the mercury lamp's output are slightly below their true value in comparison with those of the arc (see ref. above) to allow for which an arbitrary correction of 5 per cent is added to the values obtained with the mercury lamp. To find the value to which this lamp's output will fall after 200 hours' use, reference was made to a curve for the deterioration of a vacuum mercury vapour lamp published by Griffith and Taylor in 1926,³ which shows that the ratio of outputs (measured by an unscreened cell) falls from 1.9 after thirty hours' use to 1.0 after 200 hours' use; though as individual lamps of this type vary enormously in their characteristics, values thus calculated must be received with some caution.

Calculated Comparison

M.V. lamp (after 200 hours)
=1.86 Relative Intensities
"B" arc (maximum)=3.54
"A" arc (minimum)=1.00
By inverse square law:—
"B" arc at 26 in. is to used M.V. lamp at 42
in. as 9.2 is to 1.8 (or 5.1 to 1).
"B" arc at 26 in. is "A" arc at 42 in. as 9.2 is
to 1.0.

A direct comparison of erythemas was then made as a check upon the values obtained from the cadmium cell readings. Two adjacent areas of about one inch square were exposed, on the upper arm of a rather insusceptible subject, to the rays of the mercury lamp and the most powerful arc, respectively.

¹ Irradiation and Health, Two Experimental Studies, Medical Research Council Special Report, No. 131.

² Angus—*Brit. T. Actinotherapy*, March-April, 1927.
(Reprinted from *The British Journal of Radiology*, Vol. III, No. 31, July, 1930.)

The distance in each instance was two feet and exposures of one minute were given each time at this distance because, as the first table shows, equal effects might be expected from the mercury lamp and the "B" arc. This expectation was fulfilled, equal mild first-degree erythemas being visible the following day, showing that photo-electric cell measurements were sufficiently accurate for our purpose.

In assuming the accuracy of the inverse square law in comparing the effects of these sources of considerable size as modified by distance, we have found that for arcs at the distances here employed this law holds true.

Taylor has shown that it is also approximately true for a mercury vapour lamp 15

cms. in length at distances of more than 60 cms.; our lamps was only 13 cms. long.⁴

Summary

A new mercury vapour lamp was compared—for erythema effect—with the most powerful and least powerful arcs used by Dr. Dora Colebrook to irradiate school children. Allowing for a falling off of energy of the mercury lamp after 200 hours' use to a little more than half its intensity when new, the relative intensities of "B" arc at 26 in. to mercury lamp at 42 in., to "A" arc at 42 in., are as 9.2 is to 1.8 is to 1.0.

³ *F. Hygiene*, 25, 2.
⁴ H. J. Taylor. *The Actinic Practitioner and Electro-therapist*, May, 1929.

Cancer "Cures"

The announcement that Drs. Coffey and Humber of San Francisco have been treating persons suffering from malignancy by injecting a glandular extract presumed to have deleterious affect on cancer tissue, has resulted in thousands of communications and numerous visits of sufferers to the offices of these western surgeons. Before the Senate Commerce Committee at Washington, Drs. Coffey and Humber declared that more than 1,300 persons suffering from the last stages of presumably incurable cancer have been subjects of their experimentation. They insist that their work is purely experimental; that it is based upon a study of the sympathetic nervous system and the ductless glands in an effort to find a stabilizer of tissue growth.

Of the 1,300 persons receiving the treatment during the past three years, only 15 are reported to have died. The attitude of these two western surgeons is commendable inasmuch as there has been no attempt on their part to commercialize their work. Neither doctor has accepted any fee for the injections and neither has promised results. Both have discouraged patients who would be willing to travel across the continent as the subjects of experimentation.

Probably there is no other pathological condition in which the laity have become more "disease conscious." Neither pneumonia, ap-

pendicitis, nor any other disease condition is feared to the same extent as malignancy. In all other conditions the victim feels that is left at least a fighting chance. In the case of malignant disease he grasps at the straws of promise without the least critical attitude towards the source. This condition of mind has rendered the treatment of malignancy a fruitful field for quackery throughout the centuries. It behooves scientific medicine to be very careful in the matter of weighing claims of suggested forms of treatment.

The cautious scientist, says Dr. Francis Carter Wood, referring to the Coffey-Humber treatment, asks, since we all have adrenals which give off a chemical substance to the blood, why should cancer ever develop if this substance has a curative effect? It is strange that cancer should grow in the adrenals when this "healing substance" is derived. All attempts so far to find a cure for cancer have failed. "The reason for this failure," according to Dr. Wood, "is that the human being suffering from cancer has a disease in which the growing tumor is composed of cells from his own body, and hence these cells are perfectly adapted to the situation and are quite equivalent in many cases to the structures from which they arise. To destroy that tumor by serum or gland extract means that one runs the risk of destroying the healthy cells in the body. This is just what is observed."—(*Jour. M. S. M. S.*, July, 1930.)

GLEANED FROM THE ST. LOUIS MEETING

The outstanding achievement of the ninth annual session was the organization of a research council. The work of this council is cut out and some good progress should be made during the course of the year. With Dr. J. S. Hibben of Pasadena, as chairman, success is assured.

The tenth annual session of the American Congress of Physical Therapy will be held in Omaha. After considerable debate, Omaha was selected because it offered numerous opportunities for clinics, and, furthermore, it is the home of the president, Dr. Roy W. Fouts. Then, too, the Congress was founded in Omaha, and it is only fitting that the tenth anniversary session return to that city.

The instruction classes were well attended. The substantial material offered in these classes speak well for the instructors. Many of them are connected with large universities. Teaching is their professional work. The Congress was fortunate this year in securing such a high calibre of men to give the fundamental work.

The exhibits were not as extensive as in previous years. This was due to a multiplicity of conditions. The exhibit hall was well dressed up and its location was convenient to the lecture rooms.

A striking feature of the Congress session is the fact that all the business is transacted in one evening period. The chief feature of the Congress is its aim of scientific advancement of physical therapy. There is little time for business. Somehow it takes care of itself.

While the local attendance was small, those St. Louis men who were present at the meeting manifested a genuine interest in physical therapy.

The educational conference was omitted this year in order to give the manufacturers an opportunity to voice their sentiments. Their representation was a sense of satisfaction to all concerned. This part of the program needs to be developed further at future meetings as there is much good to be derived by a better mutual understanding between the

manufacturer and the doctor who utilizes its equipment.

The eye, ear, nose and throat section seems to be the place for heated discussions. There is always someone present in this section who disagrees with the essayist. The result is an interesting debate from which much is learned by both sides.

An absence of evening meetings enabled the guests and fellows to secure much needed relaxation. St. Louis is hot in September and the continuous grind of six days is enough to tax anybody's good nature.

The American Congress of Physical Therapy accomplished one valuable asset by holding its meeting in St. Louis, that of electing one of its prominent physicians, president-elect. The Congress is indeed fortunate in having among its fellows a man of Dr. Ewerhardt's attainments. He has been a sincere, ardent worker, and in his quiet way has done much for physical therapy. His co-operation aided considerably in the successful meeting.

Dr. Roy Fouts, president, got busy early and appointed all of his committees. Now it is up to him to get the committees to function. We believe Roy can do it. He appears to mean business.

Just as a side issue to those who unintentionally passed up the secretary at the meeting, let us remind you that dues are now payable. It is the custom of the Congress to collect current dues at the time of the annual session and as funds are desperately needed at present, cooperation along these lines will indeed be welcomed.

It was indeed pleasing to hear favorable comment passed on the improvement in the ARCHIVES. Without any reflection on its former publishers, the help of the Chicago office in itself has made possible such improvement as have been made. The wealth of material which will appear during the coming year is worth many times the subscription price.

ARCHIVES of PHYSICAL THERAPY, X-RAY, RADIUM

OFFICIAL PUBLICATION AMERICAN CONGRESS OF PHYSICAL THERAPY

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EDITORIALS

PRESIDENTIAL ADDRESS

As far back as one cares to delve into history, physical measures have been employed for the relief of human ailments. Up to a comparatively short time, these measures consisted principally in the empirical employment of heat in some form, or of manual massage or manipulation.

Generally speaking, the physician of a generation ago knew little of any form of treatment that could not be dispensed in the form of "pills," "powders" or "potions." Anyone who departed from the established custom of treatment was likely to be looked upon as not altogether regular in his practice and stood in danger of being designated a "quack."

The close of the nineteenth century found a few physicians in this country and in Europe sufficiently bold to depart from established customs by taking up the study of the

faradic and galvanic currents and applying them to certain diseased conditions. This was followed by the bolder use of the static machine with its condenser discharge which, perhaps, had a greater influence on the present-day revival of Physical Therapy than any of the earlier apparatus.

The past decade has witnessed the general advent of a new form of medical practice. Twenty years ago not one doctor's office in fifty contained any physical therapy equipment. Today, more than two out of every three have, or have had, some physical therapy apparatus.

However, it may be said that not every office that contains this equipment is functioning, insofar as physical therapy is concerned. Particularly is this true of the currents designated as high frequency and sine wave. Not infrequently we go into a physician's office and find good equipment in bad condition,

Delivered at the Ninth Annual Session of the American Congress of Physical Therapy, September 8th to 12th, inclusive, at St. Louis, Mo.

pushed back in the corner and covered with dust. It is clear that the physician has here neglected to take the time and trouble to understand his equipment or master its uses and applications. Not having prepared himself by proper education, he is unable to evaluate or appreciate the instrument which he was trying to operate. This inevitably resulted in discouragement and failure, and a loss of respect for a perfectly good instrument.

The fact that one is a licensed physician does not mean that he, or she, is competent or qualified to treat with physical methods. Physical Therapy today is a highly involved and scientific method of treatment and requires a great deal of preliminary preparation.

A physician who has given no time to the study and training in the correct use of the various physical therapy agents now accepted in medical practice, other than the instruction given by the salesman who sold him the machine, is no better qualified to administer this form of treatment than he would have been qualified to administer drugs if he had never studied *materia medica* and *therapeutics*. Yet I am certain that far too many physicians are attempting this form of practice with little or no scientific basis upon which to operate.

Attention is called to the above situation because I desire to stress the importance of continuing our school of instruction as has been the policy of this organization for the past several years. I speak advisedly when I say that for some time the American Congress of Physical Therapy has stood at the fore-front in work along this line.

There is need for more work of an educational nature. Gradually the colleges and universities are creating departments of physical therapy and its discipline is being added to the medical curriculum. The men who graduate from these medical schools in future years will leave with a better understanding of the basic fundamentals of this branch of therapy and will be better physicians for having had the advantage of this training. But what of the multiplied thousands who have had no training along this line? They are the ones we hope to reach and help, thereby justifying our existence and perpetuation as an organization.

After some of the pioneers in physical ther-

apy had built their own machines and provided the initial proof of their value as remedial agents, the commercial world was not slow in recognizing the economic importance of this field. Huge factories were built and large sales organizations were trained to dispose of their output. The post-war period with its rehabilitation problems supplied the field as well as the proper psychological setting for a commercial campaign along this line. Salesmen were trained to demonstrate the machines and, after learning the names of as many diseases and conditions as they possibly could, they invaded the medical profession throughout the length and breadth of the land, and attempted to convince the doctor how it would be possible to double or triple the income from his practice without leaving his office.

Upon this point I also speak advisedly. Needless to say it had a very strong appeal, particularly to the man in general practice, especially if he was approaching the age when regular hours were the more appreciated.

As a result of these extensive selling campaigns which had its peaks during the years 1921 to 1922 and from 1925 to 1926, nearly 90 per cent of all the sales were physical therapy apparatus. During this time the manufacturers and distributors were quite busy with special educational campaigns. These sales seemed to reach their height about the year of 1925. The profession became over supplied with equipment. Many had purchased some particular type of equipment and had never learned how to operate it. By a customary method of perverse reasoning they felt that the equipment did not have the therapeutic value claimed for it. As a result, they pushed the equipment into a corner and ceased to be prospects for any further Physical Therapy apparatus. The field for sales of this kind thereby became narrowed as years went by. Following 1925 the sales of physical therapy equipment broke rapidly and for the past two or three years the ratio of sales for x-ray and physical therapy equipment has reversed, it now being about 90 per cent x-ray and 10 per cent physical therapy.

There is a small class of physicians who practice physical therapy just as they practice medicine. They simply treat and treat

treat. There is the larger class, however, who give the same careful consideration to the application of physical therapy that they give to the diagnosis of a case. After a careful diagnosis, they then apply the treatment indicated—whether it be medical, surgical or physical therapy. These are the men who still have a wholesome respect for this form of treatment and would hardly know how to practice their profession without it.

The educational campaigns that have been initiated by the commercial houses for the past few years have been along x-ray lines, thereby leaving unfinished the work of physical therapy education. It is to this task that the American Congress of Physical Therapy is dedicated.

At present the organization is without sufficient funds to carry on as extensive a program as desired. In fact, this annual meeting of the Congress is largely made possible by the generous support of the exhibitors at this season. By their purchase of exhibit space they are continuing to contribute to the educational campaign which they abandoned two or three years ago. I commend them to you and trust you will find time to visit with them and become familiar with the newer types of equipment. The Congress appreciates the support of these exhibitors and desires to take the opportunity, at this time, of publicly expressing that appreciation. Their attitude toward the Congress in past years signifies the earnestness of their intention to aid in the campaign of making better physicians by making better physical therapists. We again pledge the efforts of this organization to that end.

While the American Congress fully appreciates the value of the research and experimental work that has been done, and is being done in laboratories of the manufacturers, we also realize that the clinical application of these agents rests with the medical profession. We all are cognizant of the fact that physical therapy, particularly light therapy, was hardly well established in the physician's office when a direct selling campaign was instituted to the public.

This, I believe, has done much to cheapen the cause of light therapy in the minds of many physicians, and, as a result, will be a direct hindrance to the growth of this form

of treatment. The value of light therapy properly applied cannot be over estimated. But herein lies the danger—in the hands of the layman, what chance is there for proper application? The one prime important factor is lacking:—a proper diagnosis. This can only come by aid of the physician. In theory, the manufacturer says to the layman, "Treatments should be taken only upon the prescription or advice of the physician." In practice it seldom works that way. The thing that more often happens is, that the physician is consulted after all available home remedies have failed. A light equipment or any remedial agent in the hands of the laity creates a sense of false security and should not be encouraged. What the public needs is education along the line of hygiene and preventive medicine and to leave treatment to the physician who knows, first, what to treat, and, second, how to treat it.

I believe we can say, without boasting or fear of successful contradiction, that the progress of medicine has kept pace with the advancement of Science and Industry. We can also safely say that physical therapy has made the greatest advance of any particular line of medicine during the past ten or fifteen years. Strangely enough many of the leading men of the medical profession, particularly the surgeon and internist, have been slow to recognize its value.

The creation of the Council of Physical Therapy by the American Medical Association, and its work along the line of standardization, together with the educational features connected therewith, has done more towards establishing a rationale for this branch of therapy than all other agencies combined. Its work is to be commended, and I urge the co-operation of the Congress in any and all of its undertakings.

The attitude of some of our leading physicians toward physical therapy, particularly the internist, is somewhat hard to understand. For example, while it would seem that the value of diathermy in pneumonia was established long ago beyond the question of doubt, I have never observed one of their patients being so treated. The same criticism may be made of the surgeon in reference to his cases of adenitis and surgical tuberculosis and other conditions, both medical and surgical, that

might be better treated if physical therapy was added to his armamentarium. Until the time comes when these men appreciate more fully the value of this form of therapy in all its phases, the American Congress must continue its unabated efforts to the end that they too will give their patients the benefit of all that is best in medicine.

During the past year, the *Archives of Physical Therapy, X-Ray and Radium* has become the property of the Congress. Through the benevolent generosity of Dr. A. F. Tyler, former owner and publisher, the title was transferred to the Congress during April of this year. Active ownership and management was assumed with the publication of the May issue. This splendid acquisition came in the form of a gift from Dr. Tyler and was acquired without cost or obligation on the part of the Congress.

Dr. Tyler was one of the founders of the Congress of Physical Therapy and has given much of his time and energy in promoting its activities and interests during all the years of its existence. This splendid gift at this time is an outstanding event in the history of the organization. It is fitting that proper recognition be given, and I would urge that the Board of Governors give this matter consideration at this meeting, devising whatever may seem proper and expedient in keeping with the benevolent spirit expressed by Dr. Tyler in making this valuable donation.

The *Archives* stands in the forefront of all American publications of its kind. Nowhere can one find more abundant or more authentic material than is contained in its pages. It should be the pride of every Fellow of the Congress and each should stand ready to contribute to its advancement.

In the past, much discussion has arisen in medical circles relative to the multiplicity of medical societies and organizations. Generally speaking, I believe this point is well taken. It is far better to have a few strong organizations than several weak ones. This same principle applies to the quality of membership of any organization. It is better to have fewer members of good quality, than a large membership which includes many whose practice is irregular and whose standing is questionable. It is with this thought in mind that

the Congress has rigidly adhered to the policy that qualification for membership is membership in the American Medical Association. With such a standard we can not go far wrong, and I would urge strict adherence to this principle. An increase in membership is always desirable, and I would suggest that a direct-by-mail membership campaign be considered for the coming year.

The Technicians' Bureau is a valuable adjunct to both physicians and technicians. While a great number have taken occasion to attend the annual meetings and write the examination, I believe it might be expedient to arrange for the examination to be given locally by some responsible physician designated by the Board of Examiners; the examination to be submitted by the Board and the papers returned for evaluation. I submit this for your consideration.

The standard of any organization is reflected by its membership and the character of its meetings. The quality of our membership has been discussed. I should be remiss were I to fail to call attention to the excellent program that has been arranged for this meeting.

I question if there ever has been a more substantial program gotten up by any American society on Physical Therapeutics. This program completely embraces every phase of physical therapy and has the support of outstanding medical authorities who are appearing on this program. Due credit should be given the program committee and Dr. Hollender, its chairman, upon whose shoulders the burden of providing and arranging this program has fallen. My personal thanks and gratitude are hereby extended for this splendid accomplishment. The arrangement of such a program entails an immense amount of work for the committee chairman, and I would suggest the consideration of an appreciation of a sum sufficient to compensate him for this service.

My dreams for the future of the American Congress of Physical Therapy are: That it may continue to grow and maintain the same high standard upon which it now stands; that its membership may be composed of medical men who realize that Physical Therapy is a great aid in the practice of medicine, but is

not a practice within itself; of men who appreciate the value of being a physician first and a physical therapist second; that the broadest possible information be incorporated in the pages of its journal for the benefit of those who wish to practice scientific knowledge is necessary in physical therapy—this to be freely tinctured with common sense.

In conclusion, permit me to say that I cherish the confidence and respect accorded me in electing me your President. I am humbly grateful for the trust implied and shall sincerely endeavor to serve you in a manner that shall continue to merit your confidence.

R. W. FOUTS, M.D.

X-Ray Film Storage

It is easy to forget and no doubt many of us who store and handle x-ray films already have forgotten the dangers of film storage, though if we will recall some of the disasters like the Cleveland clinic and several others of similar character, we will realize what can happen.

Fire inspectors are handicapped in many ways and often have no opportunity really to know what conditions are, and do not have authority to improve them. Some day some of the authorities will visit our offices and warn us of the dangers connected with film storage and then we should do as instructed. We should even go one better for our own protection and for the protection of our communities, by throwing out all the nitrate base films and being using safety or the acetate base films which we can file like paper and which will not explode or give off dangerous gases. We may object to the added expense, but what is expense when it may be the means of preventing disaster and saving life? We should ask our fire insurance agents for the data of the National Board of Fire Underwriters, and the Ohio Inspection Bureau on the "Nature and Action of Gases from Decomposing Films." The Indiana Inspection Bureau also will be glad to furnish information concerning these matters. It also is very important to physicians to have the x-ray department of hospitals use the safety methods. These matters should be brought to the attention of the governing boards of hospitals so they will realize the dangers of not taking

the necessary precautions. Films should be stored for at least three years. They are part of the patient's clinical record and are often of much value. Some have important legal aspects. Others are valuable in teaching. Why then should we not seriously consider the safe storage of them? The human equation always enters into these film fires, and even though every necessary precaution is taken, such as safety doors, sprinkler systems and air vents, such precautions may fail, as they did at the Cleveland Clinic. The use of safety films will stop all this. We will be free of much expense in constructing storage space, and also of much worry.

Some may say that the use of safety films adds to the expense of x-ray examinations. The general public is paying for these examinations. When the x-ray was used first it was said that it never would be of practical use because of the expense. Today it is considered one of the most valuable methods and an important aid in making diagnoses.

If these film fires are not stopped there is no doubt that there will be legislative action, and this may cause much ill-advised restriction. The subject should be studied carefully and the men interested in roentgenology should inform those in authority concerning the difference in the types of x-ray films and that safety films means what the name signifies. Only then should ordinances regulating the storage of the old cellulose nitrate films be put into effect. Let us all hope that this difference will be made so that safety films will be used universally, and then roentgenology will become a safe specialty of medicine, with the public having no fear of it.—(*The Jour. Indiana S. M. S.*, July, 1930.)

Obituary Note

It is with a feeling of deep regret that we recently learned of the death of one of our fellows, Dr. C. J. Broeman of Cincinnati. Dr. Broeman was a physician of prominence and one who contributed generously to the medical literature. He has served on the programs of the Congress and his messages were always considered timely, interesting and instructive. Dr. Broeman passed away on April 3rd of this year. The Congress takes this means of expressing its sympathy to his family.

PHYSICAL THERAPY CLINICS

PHYSICAL THERAPEUTIC METHODS IN UROLOGY *

JOHN ROBERTS CAULK, M.D., F.A.C.S.

ST. LOUIS, MISSOURI

Urology is the father of surgery, but genealogy discloses physical therapy as the mother of urology.

The earliest records of medical history reveal that operations upon the urinary tract by special instruments were among the first performed on the human body, and throughout the early development of our specialty, physical therapy played a tremendous rôle. The early operations for stone in the bladder, stricture of the urethra, as well as upon the prostate, depended upon instruments designed for the relief of physical suffering; later, with the progress of surgery, the human hand and scalpel transplanted such performances for many years, but as time progressed and science developed the mother hand, Physical Therapy has pointed the way to more delicate and accurate methods. Since the latter part of the 19th Century, the improvement in these technical devices and procedures has created a new day in our specialty. The understanding of the rays of light and heat, the perfection of delicate lenses, the discovery of electricity and the institution of accurate mechanical devices have all shared in this glorious progress and have been responsible for the nourishment and growth of this child of medicine, which, today is the best behaved, most accurate and precise in the realm of medical science. Without these appurtenances, urology could not have advanced to the stage it occupies today.

The cystoscope with its accessories and the x-ray were the creators of diagnostic urology. Your familiarity with them makes any discussion superfluous, and they shall be passed with a gesture of humble respect for its contributions.

* Read before the American Congress of Physical Therapy, Jefferson Hotel, St. Louis, Mo., September 11, 1930.

Therapeutic urology if robbed of these physical attributes would equally starve, but since nature has opened the urinary tract to the inspection and control of these appliances we should be truly thankful and my small contribution to this program shall be to consider the advantages of physical therapy in the treatment of many of the diseases of the urinary organs.

There is scarcely a morbid process involving the urinary or genital organs which is not in the main dependent upon some form of physical therapy for its alleviation and correction. Let us now consider the tremendous influence which physical therapeutic methods exert upon the routine practice of urology.

Gonorrhea

Acute gonorrhreal urethritis is believed by some authors to be definitely and accurately controlled by means of medical diathermy. I must confess my personal experience has failed to excite any positive interest in this respect. In its early phases the standard medical therapy seems to me to be the better. The susceptibility of the gonococcus to low temperature argues favorably toward the effect of accurately applied heat, but I have failed to see any real benefit in its employment in the anterior urethra. The story, however, seems different with the complications which are so frequent in this disease. Acute epididymitis is promptly and definitely relieved by the application of diathermy. Acute prostatic and seminal vesical lesions are equally well affected by the direct application of heat through the rectal electrode. Chronic lesions of the urethra and genital tract seem far less amenable, except for topical applications to certain localized areas of inflammatory reaction.

Stricture of the Urethra

It has been but a few decades since practically all strictures of the deep urethra, and most of the anterior, were subjected to surgery. In my early days of urological practice external urethrotomy was one of the most frequent operations which was performed. Today, it has practically passed into history, having been supplanted by gradual dilatations with one type or another of mechanical devices.

Bladder

Stone in the Bladder. One of the earliest operations done upon the urinary tract, indeed, upon the human subject, was for the removal of stone in the bladder, and today surgery claims many more stones in the bladder than it has a right. The lithotrite and the evacuator are capable of removing, in my opinion, over 75 per cent of all vesical calculi. The simplicity of the operation in the hands of an experienced technician, the freedom from economic loss, surgical complications and mortality rate makes this operation certainly one of choice for vesical calculus.

Bladder Tumor. Since Beer in 1910 proposed high-frequency for destruction of tumors of the bladder, most papillary tumors have been removed by some type of intravesical destruction, electro-coagulation, fulguration and the like. For the definitely malignant tumor, probably most surgeons of today are still doing open operations, associated with the application of diathermy, radium or resection. My experience in a large series of cases of malignant tumors of the bladder has convinced me that the closed bladder is the ideal. I feel positive that any tumor that can be cured by open surgery can as well be cured through cystoscopic application of either electrical current, or radium implantation or both. I, furthermore, believe that many tumors which rapidly recur following cystotomy and proceed to extravagant extensions could be destroyed by endovesical technique, associated with deep x-ray penetration. Tumors of the bladder are exceedingly frequent. Open surgery appears to me to have offered but little, mortality is far from negligible, complications common, results poor, economic loss tremendous; many of these features are curtailed by endovesical therapy and the results are much more gratifying. Uretero-

vesical cysts were formerly subjected to open surgery for their removal and today they are handled in simple fashion by electrocoagulation.

Strictures of the ureteral orifices are mechanically dilated, or incised. Ulcers of the bladder are burned by diathermy, or electro-coagulation, in the majority of instances, instead of being subjected to surgical removal or cauterization.

Obstructions at the vesical neck, benign and malignant, congenital or acquired, are more and more being removed from the field of open surgery and relieved by simpler and more effective measures. It has not been long since practically all obstructions at the vesical neck were removed by surgical enucleation. It has only been twenty-one years since urologists, under the inspiration of Young, began to attack the smaller obstructions such as contractures and bars by means of technical devices. Time is too short to enter into a complete discussion of this phase of surgery, but it is my true belief that before long prostatic enucleation will be a rare procedure. During the last two years I have with my cauterity punch operated on practically every type of prostatic obstruction, both benign and malignant, and could count the number of prostatectomies on my finger tips. I have found that the large prostatic growths, which have heretofore been considered as neoplasms, are of inflammatory origin and that partial removal of the obstruction by the extraction of one to six pieces at a time allows resolution of the remaining portions of the gland. This has occurred so uniformly that it has relegated over 600 cases of prostatic obstruction to this type of removal. Prostatic carcinoma should not be subjected to open surgery. This is a particular type of prostatic growth which must remain without raw surface, unless it be a small encapsulated lobule in the prostate suitable for total prostatectomy. The results of the punch operation in carcinoma of the gland have been exceedingly encouraging. I have operated upon 55 cases of prostatic carcinoma and have given urinary comfort to almost all of them. Of course, all such growths are subjected to radium implantation and deep x-ray penetration. With this type of surgery there is practically no mortality. In the 600 cases of punch operation, which I have performed, there have been but two

deaths. Convalescence is much shorter, hospitalization tremendously curtailed, economic loss to the patient much less and the functional results are as excellent as by enucleation methods.

Kidney

One of the most pronounced effects which physical methods have played upon the urinary tract is to be found in kidney diseases. Some years ago in analyzing 2,100 cases of kidney infection, I found 80 per cent resulted from stasis. The frequency of kidney infections is striking; namely, one in every 74 cases in the Barnes Hospital, one in every 40 in the St. Louis Children's, one in every 10 in my private office. Since the majority result from obstruction somewhere along the tract, it can be easily understood how scientific urology by utilizing mechanical devices has protected the kidney from destructive lesions. It has been but recently since nephrectomy for pyonephrosis, or destructive pyelonephritis, was one of the most frequent operations performed upon this organ. Today, owing to the cystoscope and ureter catheter, the institution of drainage and topical applications, the surgery on such kidneys has been reduced to a minimum. Thus, destructive lesions in the kidney from infection usually result from neglect. The great benefit given to the congenital obstructions of the urinary tract in children is indeed gratifying. The tremendous mortality rate in babies and young children, due to uremia resulting from such lesions, has greatly been reduced.

Fixation operations upon the kidney, operations for hydronephrosis through plastic procedures, have been lessened through systematic attention to the ureter by dilatations and drainage with the ureter catheter and bougie.

Stones in the ureter, which are exceedingly frequent, are today removed in about 95 per cent by means of ureteral dilatation. In over 300 stones in the ureter I have been compelled to do major surgery in less than 7 per cent. Care and patience, accurate observation of renal function along with the dilatations, are necessary, and repeated dilatations over long periods in many instances are effective in allowing the removal of such a preponderance of ureteral stones by simple methods. In this way, too, the kidney is protected from destructive processes, and silent destruction through ureteral block is prevented by careful observation.

In tumors of the kidney, surgical removal is necessary, but x-ray therapy assists decidedly in the cure of such lesions. I am a firm believer in both pre- and post-radiation. There seems no comparison in the results secured by surgery alone and surgery in association with x-ray penetration.

The large group of hematurias of obscure origin not associated with tumor, are in many instances relieved by topical applications, by means of the ureter catheter and, again, such kidneys are protected from surgical exploration.

It is thus self-evident that this galaxy of diseases, which is found amenable to physical therapeutic measures, has robbed major surgery of, at least, 75 per cent or more of its former possessions and it is hoped that you gentlemen who are so interested and capable in the construction of these various devices will continue to contribute scientific knowledge for the substantial progress of our branch of medicine.

The International Assembly of the Inter-State Postgraduate Medical Association of North America convenes at the Municipal Auditorium, Minneapolis, Minnesota, October 20, 21, 22, 23, 24, 1930. An elaborate program has been arranged with many outstanding physicians as guests of the association taking part. Among the numerous names included on the program are: Dr. Isaac Abt of Chicago; Dr. Lewellys F. Barker, Baltimore;

Dr. Pascal B. Bland, Philadelphia; Dr. Alan Brown, Toronto; Dr. Robert C. Coffey, Portland; Dr. Charles A. Elliot, Chicago; Dr. William D. Haggard, Nashville; Dr. E. Starr Judd, Rochester, Minn.; Dr. Samuel J. Kopetsky, New York City; Dr. Paul B. Magnuson, Chicago; Dr. John O. Polak, Brooklyn; and Dr. William A. White, Washington, D. C.

QUERIES AND CLINICAL NOTES

Q. What is the status of the treatment of asthma by ultraviolet irradiation?

A. Ultraviolet irradiation has been employed in the treatment of asthma for several years. In spite of determined efforts on the part of investigators to establish a rationale for this type of therapy, the method must still be considered empirical. The results have been variable. Some patients respond favorably, others receive improvement, while others again obtain no relief whatsoever. It is fairly well recognized that ultraviolet irradiation has a favorable effect on asthma in children. Saidman not so long ago reported that in ten cases of bronchial asthma in children the reaction to ultraviolet irradiation was favorable. He stated, furthermore, that the percentage of success is higher in older children than in infants aged less than 3 years. According to this same investigator the indications for actinotherapy are of importance. The treatment is particularly effective in cases in which enlarged tracheobronchial lymph nodes of bronchitis is present. In the adult the improvement following ultraviolet irradiation is not so marked, although with more intensive treatment patients have shown latent periods of from several months to three years.

As has already been mentioned no rationale is established, but each writer who discusses the subject attempts to give his own viewpoint regarding the action of ultraviolet rays. Saidman considers the action of the rays as originating from the effect of the irradiation on the sympathetic nervous system, and, secondly, as liberating certain substances of the skin which may act as protein therapeutic agents. A third effect of the ultraviolet rays consists in direct action on the bronchial foci.

Q. What are the possible factors concerned in the non-uniformity of results with zinc ionization in chronic purulent otitis media?

A. To begin with zinc ionization is not intended as a routine treatment for chronic otorrhea. The cases must be carefully se-

lected for this therapy. First of all, mastoid disease must be excluded. This can be done by means of roentgenograms and clinical tests. Zinc ionization is intended for the simple uncomplicated type of chronic otitis media with a large opening in the drum membrane. Factors in technic sometimes hinder successful results. The ear must be thoroughly cleansed prior to treatment either by dry mopping or by irrigation. The instillation of the zinc solution must be carefully performed and unless the solution passes into the drum membrane perforation no effect is obtained. The apparatus also tends to influence results. The speculum should be either glass or vulcanite and of such size that it will fit into the canal and be retained by fixing it to a headband or other suitable arrangement. From a careful analysis of the literature which includes positive and negative articles on the subject, the writer firmly believes that failures have been due to (1) improper selection of cases, and (2) incorrect technic.

Q. What are the physical therapy facilities necessary in a hospital which specializes in chronic diseases?

A. Levinson in the *Medical Journal and Record* (August 3, 1927), very aptly answers this question in a review of the subject. According to this writer, the essential departments were:

1. Hydrotherapy including baking and massage.
2. Electrotherapy consisting of low and high frequency currents. High frequency currents include diathermy and autocondensation. The low frequency currents consist of galvanism, faradism and the sinusoidal currents.
3. Mechanotherapy which consists of appliances which produce resistive, active and passive exercises.
4. Heliotherapy, both natural and artificial.

Q. Is physical therapy of value in cardiovascular diseases?

A. In the *Wiener klinische Wochenschrift* (March 22, 1928), Freund attempts to answer this question by reviewing the subject. The following abstract of the original article is quoted from the section on current medical literature of the *J. A. M. A.*, (June 2, 1928): Carbon dioxide baths are indicated in cases of cardiac insufficiency, in arteriosclerosis and in hypertension, whether essential or arteriosclerotic. They are contraindicated in endocarditis, pericarditis, a tendency to embolism or collapse. In cardiac neuroses and exophthalmic goiter, cooling coils over the heart, packs and other mild hydrotherapeutic procedures are better tolerated. Patients with severe decompensation are not suitable for balneotherapy. For carbon dioxide baths, Freund advises a temperature between 28 and 30° C., a duration of from ten to twenty minutes and a course of from twelve to twenty baths, one every other day.

Q. Has ultraviolet ray treatment of whooping cough proved successful in alleviating the symptoms of this distressing disease?

A. There have been numerous reports on the evaluation of ultraviolet irradiation for whooping cough. Thus far there is unanimity of opinion only in that the symptoms are slightly less severe in those children who are subjected to irradiation. The paroxysms are lessened in number, but their intensity is not markedly modified. The question of duration of treatments and their time of administration may have some influence on the problem. There is no standard technic, and until it is suggested, the physician must individualize his treatments. Nothing more can be said than that it is an empirical therapy, fully warranted, because drugs and other means have been quite unsuccessful in affording any prolonged relief to afflicted children.

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CURRENT NEWS AND COMMENT

Pacific Physical Therapy Association

June 13 and 14 brought Physical Therapy Week to a harmonious climax with the annual meeting of the Pacific Physical Therapy Association. Among the numerous papers—each developing some special point of scientific or practical interest—the following papers by invited guests evoked special interest: "Physical Therapy as an Aid to the Government Physician," by R. H. Heterick, M.D., Surgeon U.S.P.H.S., personal representative of Hugh S. Cumming, Surgeon-General, U.S.P.H.S.; "Physical Therapy in Military Hospitals," by Clemens W. McMillan, M.D., Major, M.C., personal representative of Merritte W. Ireland, Surgeon-General, U. S. Army; and "Ultra-Violet Rays in Dermatology," by Gilbert H. Larson, M.D., Lieutenant M.C., U.S.N., personal representative of Charles E. Riggs, Surgeon-General, U.S.N. Although Dr. Rollier, of Leysin, and Dr. Cumberbatch, of London, were unable to be present, their papers, "Work Cure for Indigent Patients Suffering from Surgical Tuberculosis Embodying the Use of Physical and Psychic Therapy" and "Some Forms of Arthritis in Women and Their Treatment by Diathermy," respectively, were read by the secretary and aroused interested comment.

Dr. J. E. G. Waddington, of Detroit, and Dr. M. W. Kapp, of San Jose, California, were elected delegates to the Congress of Physical Therapy at Liége.

At the annual election the following officers were unanimously selected: President, Herbert V. Mellinger, M.D., Los Angeles; Vice-President, Clinton D. Hubbard, M.D., Huntington Park; Secretary-Treasurer, J. Severy Hibben, M.D., Pasadena. The name of the organization was changed to *Pacific Physical Therapy Association*.

On Friday evening, a good-fellowship dinner was given in honor of Dr. Charles Wood Fassett, in recognition of his honorable service of forty-seven years as a medical journalist. The several speakers united in extolling one whose invariably sunny disposition has

endeared him to all who have had the honor and pleasure of making his acquaintance. The faculty of the Western School of Physical Therapy, through Dr. Willmoth, presented Dr. Fassett with a desk pen and devoutly wished that many years might yet elapse before the recording angel would call upon "Charlie" to sign his name for admission to the Immortal Club of Celestials.—*J. E. G. W. (The Medical Herald and Physiotherapist, August, 1930.)*

Prof. Paul Krause, Münster, president of the Rheinisch-Westfalische-Röntgen Society, has announced the proposal of erecting a monument to Roentgen in the birthplace of Lennep. The plan is to raise one-fourth of the cost of the monument or \$2,500 from American roentgenologists. So far \$900 has been raised and it is hoped that the remaining \$1,600 will be contributed by 1,200 roentgenologists who have not yet responded. Contributions are to be sent to Otto Glasser, Ph.D., 2050 East Ninety-Third Street, Cleveland.

At the thirty-first annual meeting of the American Roentgen Ray Society, West Baden, Ind., September 23-26, addresses will be given by Drs. Donald S. Balfour, Rochester, Minn., on "Relationship Between the Roentgenologist and Surgeon in Treatment of Diseases of the Stomach and Duodenum"; William F. Braasch, Rochester, Minn., "Intravenous Urography"; Ray A. Carter, Los Angeles, "Coccidioidal Granuloma: Roentgen Diagnosis"; Otto Glasser, Ph.D., Cleveland, "Wilhelm Conrad, Roentgen and the Discovery of the Roentgen Rays," and Raphael Isaacs, Ann Arbor, "Blood Changes in the Lymphomata and the Leukemias and Their Bearing on Roentgen-Ray Therapy."

Actinotherapy

Considerable discussion has recently taken place in this country, in America, and in other lands regarding the advantages and disadvantages of artificial light application or actinotherapy in the treatment of tuberculosis and other diseases. We have received an impor-

tant and informing communication on the subject, issued by the United States Public Health Service, from which we reproduce the following: "Since the amount of natural light from the sun, and especially its ultraviolet ray content, varies with the geographical location, the season of the year, and such local conditions as the amount of dust, smoke, and moisture in the atmosphere, under some conditions reliance may be placed on sources of artificial radiation. These sources are generally called lamps or radiators. There are different types of lamps used for the production of artificial light for therapeutic purposes; first, those that emit heat, light, and ultraviolet rays in approximately the same proportion as sunlight; second, those in which ultraviolet rays predominate; and third, those that emit light and heat, but little ultraviolet light. The lamps of the *first* type have white-hot filaments or electrodes, which emit light and heat, and have also incandescent mercury vapour, or a carbon arc, which emits ultraviolet rays. In these lamps the incandescent mercury vapour, or the carbon arc, is shielded from the person using it by a globe, or plate, of a special kind of glass which cuts off the very short ultraviolet rays which might be harmful. These lamps are so designed that the ultraviolet, light, and heat radiations emitted by them are combined, as nearly as possible, in the same proportions as in natural sunlight. Since the radiation from them is very similar to sunlight, they may, to a certain extent, be used in place of, or as a substitute for, sunlight. If these lamps are to be used in the treatment of any disease or over long continued periods of exposure, one should have the advice of a competent physician. At all times caution must be observed in exposing oneself to any lamp. When using these lamps it may be necessary to use goggles to protect the eyes. The *second* type of lamp, such as the unscreened mercury vapour, or the unscreened carbon arc lamp, besides light, heat, and antirachitic ultraviolet rays, emits a large amount of ultraviolet rays of very short wave length. Such lamps should only be used upon the advice and under the direction of a physician. The large amount of antirachitic ultraviolet light emitted by them makes them very useful when operated by the physician, but dangerous when used by the layman without the advice of a physician. For the same reason such lamps should never be used with-

out goggles to protect the eyes. Excessive or improper use of ultraviolet rays may cause serious injury to the eyes, injury to the skin, serious symptoms in persons with low blood pressure, and unfavourable effects in persons with early tuberculosis. Exposure to ultraviolet radiation may cause restlessness and, in overdoses, anaemia. Severe burns are also sometimes experienced. The *third* type of lamp is similar to the ordinary incandescent lamp used in electric lighting. It emits both light and heat. The very small amount of ultraviolet light emitted by it is of long wave length and is negligible in quantity. The rays of light and heat from these lamps heat the skin and the superficial tissues. They have been found to be useful in the treatment of rheumatism and similar troubles. The only danger from them is that of a burn such as would be experienced by exposing the skin in front of a hot fire. It will be evident from this discussion of the different types of lamps in use that a lamp that would be useful for one purpose would not be useful for another, and indeed might have a harmful effect. It is evident that a person without medical training should not select and use a lamp at random, but before purchasing and using a lamp should consult his physician."—(*British Jour. of Tuberculosis*, 24:161, July 1930.)

Council on Physical Therapy

The Council on Physical Therapy reported increased activities during the year covered by the report of the Board of Trustees, these having been concerned chiefly with the dissemination of information concerning the merits and limitations of physical methods and energies as therapeutic agents. Progress is slowly but surely being made in divesting physical therapy of exaggerated and uncritical claims with which its advance has been hampered. An increasingly conservative and scientific attitude on the part of the better manufacturers of physical therapeutic equipment and on the part of authors of papers on physical therapy is being noted. Scientific investigators in the larger universities and medical schools are seriously undertaking experimental work in determining the biologic effects of light, heat and physical exercise and their limits of therapeutic application.

By means of special articles, addresses before scientific societies and other gatherings and radio broadcasts under the auspices of

the Council on Physical Therapy, the medical profession and the public are being informed of the possibilities and impossibilities of physical therapy as a curative or preventive agent.

In all of its educational activities this Council endeavors to point out the importance of physical therapy in medicine as an adjuvant rather than as a sole method of treatment. The Council expressed its opinion that too much emphasis has been placed on apparatus therapy and not enough on the possibilities of such measures as heat, massage, therapeutic exercise and occupational therapy.

The Council has cooperated with the Bureau of Investigation in exposing worthless devices by conducting experiments to determine the physical characteristics of such contrivances and their actual biologic effects. The Council has also cooperated with governmental agencies and other investigative bodies in combating the sale of harmful and useless apparatus for the purpose of self-treatment. The publishers of a number of the better periodicals have conferred with the Council regarding claims that might legitimately be made in advertisements of devices sold to the public.

The various committees of the Council have prepared and published reports dealing with nomenclature in physical therapy, with x-rays as a diagnostic agent, and with x-rays and radium as therapeutic agents in deep-lying and superficial conditions. A committee on education is preparing a bibliography on physical therapy and related subjects, and the committee on standardization has undertaken a critical survey of the scientific literature.—(Am. Med. Asso. Bull., 25:122, June 1930.)

Physiotherapy in Treatment of Rheumatic Diseases

The use of a variety of physical methods of treatment in rheumatic diseases is discussed by different authors in the current Bi-Annual Rheumatism Number of the *British Journal of Actinotherapy and Physiotherapy* (17, Featherstone Buildings, W. C. 1., 2/6, post free).

Prof. Arnold Zimmer, chief of the Rheumatism Dept. of Prof. Bier's Surgical Clinic at the University of Berlin, writes on "The Local Paraffin Treatment of Rheumatic Diseases", and introduces a new method of applying paraffin wax known as *parathermy*. By this method a mixture of paraffin waxes of

different melting points are held in contact with the affected joint by means of rubber holders made to fit the joint. These are fastened to the joint by a clasp, and the melted wax poured in through a screw-top opening. This method, which is reported to give excellent results, can also be combined with mechanical extension of the joint.

The use of actinotherapy is discussed by A. P. Cawadias, O.B.E., M.D., M.R.C.P., who indicates the various methods in which artificial light treatment can be applied in rheumatic diseases with good effect. The methods discussed are (a) actinic shock combined with local actinic revulsion, and (b) mild actinic stimulation combined with local infra-red application.

The physical treatment of fibrosis is the subject of a paper by R. G. Gordon, M.D., D.Sc., (Bath). The scheme of treatment advocated is (a) relief of acute symptoms, (b) removal of underlying causes, (c) destruction of nodule, and (d) counteracting of constitutional factors to prevent recurrence. The various ways in which baths, U-V and infra-red irradiation, diathermy, massage and other means can be used for these purposes are outlined.

Dr. Gunnar Kahlmeter of the Aso Hospital, Stockholm, contributes a paper on the Roentgen treatment of arthritis which is being used to a considerable extent on the Continent, but which is still very little used here. He gives details of a series of 323 joints thus treated, with complete freedom from symptoms in 22 per cent and improvement in 64 per cent.

The extent to which balneological treatment is used in combating rheumatic affections in Soviet Russia is admirably shown in a paper by Prof. Danischewski, director of the Central Institute for Balneology, Moscow. Details of the various treatments, and the methods by which the patients are selected, are given in an interesting survey.

Other papers include one by W. J. Turrell, M.D., on the concurrent administration of diathermy and the constant current, with a note on the method of convection of these currents through the tissues; and a paper by P. Bauwens, M.R.C.S., L.R.C.P., on the combination of diathermy with other therapeutic currents and with mud packs.

THE STUDENT'S LIBRARY

ANLEITUNG zur DIATHERMIEBEHANDLUNG. (Introduction to Diathermo-therapy). By Dr. G. Bucky. New York. Third Edition, Pp. 234 with 138 Illustrations in Text. Publishers, Urban & Schwarzenberg, Berlin and Wien, 1929.

The author has practically included no new material in this, his third edition. He dismisses the necessity for this by stating in his preface that no new contributions have been added to the discipline of Diathermy in recent years. This is rather a startling statement on the part of the author whose residence in the past few years was amongst the very pivotal center of investigation of diathermy penetration, namely, at the Rockefeller Institute in New York. While the author may be conscientiously convinced of this, the reader, nevertheless, is entitled to an up to date review and also of an evaluation of the newer contributions. This the author has failed to do or include even in his bibliography.

With the exception of the above mentioned criticism, this book is an excellent monograph on the subject of diathermy. It covers the theoretical and practical side of the problem in an intelligent manner. There is no redundancy and there is no padding. The subject is graphically described. The physician interested in Diathermy will profit greatly by reading this book because the author brings to his theme a large experience on the subject. We agree that it is a waste of good time to enter into such sterile controversies as to the "Elektrodenformen" and arguments on "variation of method." The author has contributed one of the outstanding practical books on Diathermy, and the profession in America await its translation into the English language with friendly interest.

ELEMENTS OF PHYSICAL THERAPY. By William W. Worster, A.B., A.M., M.D., Associate Professor Therapeutics, College of Medical Evangelists; Director, Southern California School of Physical Therapy; Former President, Pacific Physical Therapy Association, etc., etc. Second Edition. Revised and enlarged. 232 pages. Illustrated. Leatherette, \$5.00. San Gabriel, California: The Worster Laboratories, 1930.

Twenty-two chapters comprise this little volume which is intended primarily for students of physical therapy. The various currents and radiations are considered in a sufficient manner to offer the beginner a comprehensive knowledge of the more important elements of physical therapeutics. The presentation of the subjects clearly indicate on the part of the author an extensive teaching experience. The illustrations which are ninety-seven in number are helpful in numerous ways and the student must at once appreciate the care which has been exercised in their preparation.

The chapters on nerve and muscle regeneration and muscle training are especially noteworthy. The importance of these subjects is too often underestimated. Here the author shows that he considers them as significant in therapeutics as other methods. Only brief mention is made of therapeutic possibilities in special diseases. This is probably a good quality as it avoids the tendency of making claims which sometimes create the belief that physical methods are panaceas for all ills.

The descriptions of technics are well given and easy to follow. Not only the beginner, but also the advanced student can gain much from these pages. The book is free from padding. It is up to date in every detail and should be especially commended for calling to the attention of the reader certain problems which were formerly considered closed but which newer investigations have shown to be unsettled.

The printing and binding are excellent. The general preparation of this text demonstrates that care and conservatism were always its keynotes.

MEDIZIN GYMNASTIK UND PÄDAGOGIK IM KAMPFE GEGEN DIE TUBERKULOSE (Harmonische Behandlung). (Cooperative Management by Medicine, Gymnastics and School Instruction in the Warfare Against Tuberculosis). By Professor Dr. Eugen Kisch—Berlin, Arztlicher Director Des "Instituts Der Stadt Berlin Für Knochen Und Gelenkkrank" Und Der "Heilanstadt Für Aussere Tuberkulose in Hohenlychen." With a foreword by Geh. Med.-Rat Prof. Dr. August Bier, Paper; Pp. 83, with 49 Illustrations and 34 Roentgen Pictures. Leipzig: Georg Thieme, publishers, 1930.

In this small volume the author, one of the notable pioneers in open-air and heliotherapy of Germany, discusses the management of the ambulatory tubercular child by the combined methods of sun radiation, open air treatment, medical gymnastics and open air school instruction. The foreword, written by the famous Bier, is frankly in great sympathy with the movement instituted by Kisch. Among the many other significant statements made by the former, the following epigrammatic statement stands out as worthy of quotation. "Es scheint, das man heute noch nicht allseitig begriffen hat, das es wichtiger ist, gesunde Menschen nicht krank werden zu lassen, als Kranke von ihrer Krankheit zu heilen." (It appears that we have not altogether appreciated that it is more important that we prevent the healthy person from becoming sick, rather than to heal the sick from their sickness). Bier pleads for prevention as an important phase of modern medicine. He also feels that the attitude of the profession toward management of the

chronic patient is not altogether progressive. He is permitted to spend his time in a hospital and to waste and degenerate in it, (*Er verbummelt und verdirt darin*).

The book is a concise exposition of the value and effect of natural and artificial sunlight therapy in the low level countries and it demonstrates its beneficial effect on ambulatory types of cases when combined with open air management. Kisch has incorporated, herein, his sixteen years of observation in the treatment of various forms of tubercular conditions. He has arranged his data in a tabulated form and, therefore, easily comprehended. The value of these statistics is proof that such ambulatory cases as glands, joint and bone tuberculoses can be readily healed within a large city as Berlin. In order to prevent the wasting of muscle tone and to hasten the restorative processes of joints and the adjacent muscle groups, regulated gymnastics are also included. The many illustrations and x-ray pictures greatly speed the reader's comprehension of the subject under discussion. The reviewer frankly acknowledges his admiration for the well balanced selection of the scientific material which has been incorporated in this small volume. This book is undoubtedly one of the finest and most authoritative that has been published in recent years. It is clearly written, and generously illustrated. The publishers, also, should be highly commended on the physical make-up of this book. It is highly recommended.

ULTRAVIOLET RAYS IN THE TREATMENT AND CURE OF DISEASE. By *Percy Hall, M.R.C.S. (Eng.), L.R.C.P. (Lond.), Hon. Actino-Therapist, The Mount Vernon Hospital, London, and Northwood, etc.* With Introductions by Sir Henry Gauvain, M.A., N.D., M.C. (Camb.), F.R.C.S., Medical Superintendent, Lord Mayor Treloar Cripples' Hospitals, and Leonard E. Hill, M.B. (Lond.), F.R.S., Director, Department of Applied Physiology and Hygiene, National Institute of Medical Research, London. Fourth Edition, Cloth, Pp. 248, with 65 Illustrations. St. Louis: The C. V. Mosby Company, 1930.

The present edition is a considerably better balanced treatise on ultraviolet rays than that which customarily falls into the hands of the general practitioner.

The usefulness of ultraviolet therapy is expounded by the author in an understanding manner. The volume discusses the relative value of sunlight, heliotherapy and artificial light sources as an aid to general health. It is preceded by a short historical introduction on the antiquity of sun treatment and its wide practice amongst the many ancient nations. It is interesting to realize that modern actinotherapy is but a revival of an ancient classical practice and that the growing appreciation of its value as a health measure is not based upon blind precedent but rather upon the evidence of new scientific facts.

The contents of this volume incorporates the wide experiences of the author who has pioneered in this new field. It is intended as a practical guide to ultraviolet practice, and is, therefore, a timely exposition on the subject. It points out the possi-

bilities and the limitations of actinotherapy. It correlates the physical with the physiological facts on the subject. Special chapters are devoted to the physics of light, the physiology and biology of light and certain untoward reactions that may be evoked from either indiscriminate uses, or from peculiar individual sensitization to light.

Although the title of the book indicates that its thesis is limited to ultraviolet rays, the author, nevertheless, has incorporated a chapter on infrared radiation and has pointed out the value of diathermy as a potential adjuvant in certain selected conditions. The prophylactic value of ultraviolet has been incorporated in a special chapter in which the author discusses the hygiene of light.

In a general way the author has attempted to explain the nature of radiation, its influence on biologic structure, its indications and its limitations and its practical application. There is a special chapter that deals with "The Technique of Administration and Dosage." The author calls attention that "the technique of administration and dosage varies with the source and type of lamp employed, the nature of the disease, the age, sex, and idiosyncasy of the patient, but certain general rules must be laid down in all cases," in order to obtain the most desirable results. This and the last chapter (Summary on Dosage) should have a special appeal to the practical-minded physician, whose purpose is to obtain maximum uses from his lamp. The last chapter serves as a "ready reference" for this purpose. It epitomizes the author's views on how to best exploit these valuable rays whether they emanate from a mercury in quartz burner, a tungsten or carbon type of lamp. The author has felt justified to incorporate in this edition, a timely warning on the dangers of the uses of ultraviolet lamps in the homes. The burden of this chapter is laid at the door of the aggressive manufacturer. The author's solution is far from practical when he advocates its supervision by the medical profession. Unfortunately, it has been the reviewer's experience that the profession has had much to do in the loose recommendation of its use by the lay people. The average physician still considers the use of ultraviolet as a harmless if not a useless method of self-treatment. To educate the layman we must first educate the practitioner. Therefore, this chapter is timely in its efforts to direct attention to the dangers of self administration with such an agency as ultraviolet light.

The volume contains a very practical exposition of the newer values of light therapy. A generous portion of the book is devoted to the clinical utilization of this agency. Many case reports are included as evidence of its value. One leaves this portion of the book with an impression that much of the clinical work has been poorly controlled, and is not as impressive as one would desire. Under the circumstances the enthusiasm that is herein displayed is unjustified. I call attention, for example, to case 42, a hemiplegic patient of nine years' standing, who was supposedly cured after several series of treatment with ultraviolet light. The book is well illustrated and printed in clear type. It is recommended to the profession as a practical guide to ultraviolet ray therapy.

INTERNATIONAL ABSTRACTS

Iontophoresis for Treating Skin Diseases. E. Kästenbaum.

Dermatologische Wochenschrift, No. 7, 1930.

Iontokataphoresis had been introduced into medical therapy decades ago but has since then been neglected, perhaps because it requires a very careful technique. But it has very special advantages for the treatment of skin diseases. The introduction of medicaments into the skin and even deeper into the organism by this means may be readily demonstrated. The dosage is generally 1 MA per square cm and the application lasts 10 to 30 minutes. Lead plates of metal grids are used as electrodes, and are placed on strips or gauze, mull, or linen, that have been soaked in the solutions. The author generally uses little sponges which may be easily boiled and which permit comfortable and elastic application of the plate in spite of unelastic bindings. The binding is done with tape or rubber bands, in cases where no manual assistance is required or if the application is done under a fluid. The larger inactive electrode is applied somewhere on the arm or leg; for strictly localized treatment a hand electrode wrapped in a damp cloth is enough, for treatment of larger areas a large electrode on the back is used. Burns occur when the electrodes are badly applied, when the current is too strong, when the medicaments are too concentrated and when the cloths are not sufficiently damp. Rings must be taken off before treatment since burns are liable to occur especially around settings or when close contacts are made; the gold is also liable to be etched away. Where the epithelium of the skin is disturbed (in eczema for example) burns occur of course more readily than otherwise.—A large variety of medicaments is used with iontophoresis. The author uses the method for anaesthesia for treatment of a number of diseases with adrenalin, quinimum, bimuraticum, cocaine and ammoniac; no special effects are noted with Na. salicyl, Na and K sulphuricum, K tartaricum, K aceticum and ichthyol.

For acne rosacea use at two day intervals quininium muriaticum 1% to 5% + adrenalin (1:1000) 5%, or 5% adrenalin (1:1000) alone. The same medicaments were successful for red nose. For acne vulgaris quinine-adrenalin was used as above and in addition 5% ammoniac solution; this last requires that the eyes and lips be protected, and marked dessication of the skin results. In defluvium capitum (seborrhoea) some improvement is secured with quinine bimuraticum + ammoniac. Iontophoresis with cocaine-adrenalin produces complete anaesthesia for superficial interventions with removal of tattoos, telangiectases, pigmented naevi, scarifications, etc. The analgetic effect may also be

successfully employed for chronic painful affection not proceeding from the skin. For milder neuritides, neuralgias, rheumatic muscular pains, and epicondylitis, three or four cocaine iontophoreses that do not go to complete anaesthesia may bring complete and lasting relief. The action was transient for herpes zoster and hemicrania; large joints (hip joint) could not always be freed of pain. The active electrode is placed on the point corresponding to the pain projection on the skin.—(*Ars Medici*, 8:226 (May) 1930.)

Physical Treatment of Neuroses. Dr. Ludwig Stein.

By Primärarzt Medizinalrat, Vienna.

First in importance is hydrotherapy; avoid prescribing cold water cures for everything though. Lower water temperatures are refreshing, but excite the peripheral nerves at the same time and act indirectly on the central nervous system too. Cool baths may prove especially disadvantageous for neuroses that are accompanied by restlessness, excitability, and insomnia. Luke-warm baths (90°—95° F.) are especially useful here. Luke-warm packings are useful too; these are made either for the entire body up to the neck, or else three-quarters up to the arm-pit. Continuous warm baths (95° to 100° for 30 to 45 minutes or more) with or without aromatic additions (camomile, pine, Fluinol) are often helpful for severe insomnia and restlessness. For mild insomnia the warm footbath before retiring should not be neglected; it is also valuable for nervousness and insomnia in sclerotics. Cool baths are good for neuroses with depressions, and are best given in the form of half baths, not under 82° F. cooled down to 77° F. Partial rub-downs in bed (77° to 82° F.) or complete rub-downs out of bed are also often used.

As for electrotherapy, galvanic current is used sagitally and diagonally through the head for excitable conditions (3 to 4 MA). Occasional cases of mild insomnia react favorably to application of the galvanic current directly before retiring. The patient may be instructed to manage this himself. Galvanisation of the spinal column is also used (large cathode affixed to the chest, the anode is fastened or moved on the spinal column). The galvanic current is also used for various convulsive conditions in neurotics (pyloric spasm, spasm of the vesical sphincter ani, etc.). Faradisation is used mainly for organic disorders that accompany neuroses, thus, for example, for atony of the gastrointestinal tract, for muscular weakness, sexual disorders, etc.—Of other physical agents blue rays may be mentioned for their sedative effects. Ultra violet light is best avoided, especially for excitable conditions, likewise prolonged exposure to the sun.—(*Ars Medici*, 8:203 (May) 1930.)

Eine Vorrichtung Zum Schutz Gegen Diathermie-verbrennungen. (A device for protection against diathermy burns). J. Kowarschik.

Wien. klin. Woch., 1930, Jg. 43, Nr. 15, (April), p. 460-461.

The author has in the following manner solved the problem of having the patient, himself, rapidly turn off the current without incurring danger. The current furnished by the electric light mains energizes the diathermy apparatus and runs over a contact which can be shut off by a small electromagnet. The latter is brought into play by a feeble current, derived from the light mains by the aid of a bell transformer, and passes through a cord which is conducted into a small pear-shaped key which the patient keeps in hand. A slight pressure on the key turns on the current, which, in turn works the electro-magnet which shuts off the primary current. The primary current, itself, can only be turned on again by special lever, out of reach of the patient. As the small switch delivered to the patient, has a tension of only 6 volts and is free from grounding, there is no danger, whatever, for the patient.

Der Derzeitige Stand Der Dermatologischen Kosmetik. (The actual status of dermatologic cosmetic). C. Hoffman.

Medizin. Welt, 1930, Jg. 4, Nr. 21, (May), p. 744-746.

Skin cosmetic makes use of carbon dioxide snow and the various methods of electrotherapeutics, besides the knife. Electrolysis and surgical diathermy, are, doubtlessly, the most important operative techniques in this regard. Surgical diathermy can be used either as electrocoagulation or electrodesiccation, or in the form of the endotherm knife. The cutaneous, subcutaneous and cavernous angioma and deep-seated nevi are indications for coagulation in the field of the cosmetic. Desiccation, i.e. shrinkage by the process of dehydration obtained by higher voltage is used in vulgar, juvenile and senile warts, fibrous nevi, superficial pigmentation, cutaneous cavernous angioma, and lupus erythematodes. It yields the smoothest scars and affords the greatest insurance against the formation of keloids. As regards the indications for the use of the diathermy knife, it is not yet possible to define it strictly. Thus far the author has treated by this method epitheliomata, pedicled fibromata, rhinophyma, tattovagis, and keloids. He has obtained particularly good results in epithelioma and rhinophyma. Surgical diathermy is not fit for the treatment of nevi flammei. The results obtained here by carbon dioxide snow, the water cooled quartz lamp or the Finsen-lamp are better; but here too, the results are very poor. Remarkably good results can be obtained by the use of thorium X, though only with a good deal of patience.

The most rational treatment of hypertrichosis consists in killing any individual hair papilla by the direct current. This can also be performed with less time and consequently with less patience and nervous strain by the (bipolar) high frequency current. Most of the dermatologists have not yet been able to convince themselves of the harmlessness of the radiologic depilation to skin and glands.

Die Theoretischen Grundlagen Der Balneotherapie. (The theoretic bases of balneotherapy). Karl Harpuder.

Dtsche med. Woch., 1930, Jg. 56, Nr. 18, (May), p. 748-750.

On the basis of experimental work, the author concludes that the action of baths is due to its thermal, mechanic and chemic effects. The thermal influences are first of all due to a particularly heavy tax on the thermoregulation of the body, which leads to changes in the peripheral circulation, and to a transitory stimulation of the whole metabolism. There also seems to be invoked an imbalance of the autonomic nervous system, at least in the skin. Variations in the composition of the blood and the secretions of the system are of secondary nature. The mechanic effects of the bath are changes of the respiratory mechanism, changes in the venous pressure due to hydrostatic pressure and reduction of the movement apparatus by buoyancy. Chemical effects alone are specific to medicinal springs and are apparently due to absorption of solved ingredients through the skin or the exchange of solved ingredients between the skin and bath water. As the first alternative refers only to a few lipo- and hydro-soluble substances—first of all to carbonic acid—the latter mode would seem to be of more universal importance. Changes of the salt content of the skin are thus produced which in turn effect the function of the skin and indirectly the whole of the system. The effect of mineral waters, therefore, influences certain physiologic changes in the skin organ, namely in actions on its chemism, blood supply, and nervous balance.

Erfahrungen Auf Grund Von 1000 Mit Diathermie Behandelten Faellen. (Experiences based on thousand diathermized cases). J. von Bueben.

Ztbl. f. Gynek., 1930, Jg. 54, N. 17, (April), p. 1054-1058.

The author's experiences with diathermy have been very favorable. His observations have demonstrated a high percentage of improvement and recovery in chronic inflammatory affections of the pelvis. As an average, 3 or 4 courses of treatment of ten sittings each are necessary; improvements can also frequently occur in a shorter period. Treatment was given by the abdomino-dorsovaginal route in the intermenstrual period. The good results obtained in treatment of gonorrhea are less to be attributed to the bactericidal powers of the treatment than to the beneficial hyperemia. Generally, however, diathermy only plays the role of an adjunct to the therapy of gonorrhea of the female; therefore, the usual bactericidal remedies should likewise be applied. Diathermy, when combined with the usual modes of treatment of the bladder, exerts very favorable effects in stubborn cystitis and pain; tenesmus and incontinence clear up following a few applications. Generally, the technic of the author was as follows: three treatments a week, of from 20 to 30 minutes duration, additional application of vaginal electrodes along with the external abdominal and dorsal plate electrodes, and finally the use, also, of rectal electrodes, according to the localization of pain.

Wirkung Der Thermalbaeder Auf Innere Sekrete, Den Stoff — Und Gaswechsel. (The effect of thermal baths on endocrine secretion, metabolism and respiratory exchange). W. Grunow. *Ztschr. f. wissenschaftl. Baederkunde, 1930, Jg. 4, H. 8, (May), p. 753-764.*

Thermal baths produce both a general and local stimulation to the cells; by this also, hypofunctional endocrine affections can be improved from its state of dysfunction. In this field falls the favorable action exerted on dysmenorrhea, myxedema, exhaustion due to febrile infections, the added energy in old age due to decrease of the maintenance exchange and to functional deficiency of the endocrine glands. Thermal baths act very favorably when basal metabolism is decreasing following the physiological menopause. After roentgen castration it induces an increase of the basal metabolism, due to stimulation of the thyroid gland which is the hormonal organ for the deficient function of the ovary.

Unsere Methode Der Roentgenbehandlung Der Basedowschen Krankheit. Bei Älteren Frauen. (Our method of Roentgen ray treatment of exophthalmic goiter in older women). Anna Jugenburg.

Strahlenther., 1930, Vol. 36, H. 3, (May), p. 491-501.

Graves disease in older women is distinguished by its particularly severe course. The imbalance in the endocrine system is due to lesions of the ovaries, thyroid gland and hypophysis. The method of irradiation of women affected by exophthalmic goiter at the age of over 40 years, consists in the irradiation of the thyroideal and thymic regions as well as of the pituitary gland. In those cases in which no improvement occurs after the first irradiation series of the thyroid region, irradiation of the pituitary gland is indicated. The latter procedure is also to be observed in those younger women affected by exophthalmic goiter wherein hyperfunction of the pituitary gland, due to whichever physiologic process (pregnancy) is a concomitant factor.

Herz Und Kreislauf Bei Hypertonie. (Heart and circulation by hypertension). N. Jagic.

Wien. klin. Woch., 1930, Jg. 43, Nr. 11, (March), p. 336-337.

Treatment of heart hypertension requires, first of all, that heart and circulation be spared, and above all, that angospasms can be avoided. The avoidance of psychic excitements, bodily overstrain, excessive supply of liquids and heavy meals play an important part. The administration of theobromin preparations for decreasing the blood pressure and sedatives, e.g., luminal, are beneficial. For painful sensations and paresthesias located in the course of vessels, diathermy often exerts good effects. Direct diathermy of the cardiac and aortic regions should preferably be avoided, as there sometimes occur untoward by-effects. Here it is better to substitute mercury vapor quartz light treatment for diathermy. Blood-letting, too, involves a convenient sparing of heart. As to balneo-therapy, the author points out

that as far as his experiences go, carbonic acid baths are for the most part poorly tolerated. He recommends warm baths mixed with pine needle extract or oxygen baths. The patients tolerate these baths unusually well.

Radiumtherapie Bei Blutkrankheiten. (Radium-therapy in diseases of the blood). N. Jagic and G. Spengler.

Wiener klin. Woch., 1930, Jg. 43, Nr. 23, (June), p. 705-708.

In leucemias and lymphogranulomatosis the same effects may, on the whole, be obtained by radium-therapy as by roentgen ray irradiation. It is impossible to heal these diseases by radiotherapy; moreover it is still dubious whether essential prolongation of life can thus be obtained. Radiotherapy should nevertheless be applied when it is intended to induce the involution of swellings of the spleen, liver and lymph nodes, especially when symptoms of compression of the adjacent organs have occurred thereby, as for instance the trachea, or severe pain due to the compression of nerve trunks. Radiotherapy should be given as gently as possible and excessive irradiations avoided, because they can cause more harm than benefit. The leucocyte count is lowered in a particularly rapid and marked manner. The patients feel better after the irradiation. The swelling of the spleen and lymph nodes are caused to recede and there is a symptomatic improvement. Radium therapy also exerts a favorable influence on the red blood count, so that the co-existence of a more severe anemia would rather seem to argue for the administration of radium irradiation. The authors have observed that radium therapy produces a decrease in the volume of the spleen and lymph node and lead to an improvement of the blood picture. The general condition is favorably influenced. Radium irradiation is therefore a gentle mode of treatment of leucemias and lymphogranulomatosis and is as efficacious, and even more adequate at times than roentgen ray treatment, provided that the indications are correctly established.

Energetic roentgen ray irradiations are indispensable in all the cases in which a rapid effect is wanted, e.g., in large mediastinal tumors of leucemic or lymphogranulomatous origin, causing compression manifestations of the air passages. Cases with superficial swelling of the lymph nodes of leucemic or lymphogranulomatous nature require radium irradiation. For advanced cases of the aforesaid affections, associated with anemia and cachexia, preference should be given to radium irradiation, because this treatment is more gentle and brings about a general improvement. The use of roentgen ray irradiation in such cases often produces poor results. It seems, that roentgen ray irradiation is preferable to radium treatment in the management of leukemic myeloses, except for cases complicated by marked anemia and cachexia.

Viosterol (Irradiated Ergosterol). Prophylactic and Therapeutic Dosage. Julius H. Hess, M. D., Henry G. Poucher, M. D., Maurice L. Dale, M.D., and Reuben I. Klein, B.S.

J. A. M. A., Vol. 95, No. 5, August 2, 1930.

This is an exhaustive study on the prophylactic and therapeutic dosage of viosterol (irradiated ergosterol). The prophylactic studies started with 225 infants, of whom 162 were retained. The remainder were dropped because of poor attendance or unwillingness to cooperate. Seventeen cases of rickets were studied. Several complete tables convey comparative results. The therapeutic effects of viosterol were investigated as was the effect of large doses of viosterol. The report covers numerous details such as changes in the blood picture, immunity to tuberculosis, etc.

The authors' conclusions are so important that they are given *verbatim*.

1. *Determination of the Prophylactic Dose.*—Several factors must be given due consideration in the determination of the prophylactic dose. It is obvious from our knowledge of the pathogenesis of rickets that insufficient mineral deposition during fetal life as seen in twins and premature infants, rapidly growing infants and babies with repeated infections and diarrhea must be given special consideration. From our blood chemistry determinations, 10 drops of viosterol in oil a day was the smallest dose that prevented a fall in both calcium and phosphorus from the first of the later months of the first year of life, though in two cases presenting diarrhea and infection even 20 drops daily was inadequate to prevent a fall in calcium and phosphorus. No infant on more than 10 drops of viosterol in oil daily developed clinical, roentgenographic or blood chemistry evidence of rickets.

From these facts we may conclude that for the average normal infant from birth to 1 year of age, under varied environmental and seasonal conditions, in the temperate zone, 10 drops of viosterol in oil a day is the minimum dose for prophylaxis. It should be started during the first weeks of life.

2. *Determination of the Optimum Dose for Therapeutic Purposes.*—It is impossible to draw conclusions as to the optimum therapeutic dose from the small group observed. The degree of rickets must be considered in every case. We found that mild rickets will frequently heal on from 10 to 15 drops of viosterol in oil daily while other cases more advanced will require larger doses. In some severe cases 15 and even 20 drops did not prove adequate. Infants on 30 to 40, 50 and 60 drops showed uniform healing clinically, chemically and by roentgenogram.

We have attempted to compare the actual time of healing in rachitic infants treated with viosterol in oil and the results obtained by others. But such factors as season of the year, degree of rickets, difference in strength and dosage of the product used must be carefully evaluated before a suitable basis of comparison is obtained. In the small group of cases studied the average time required for demonstration of healing in the roentgenograms and definite blood chemistry changes was about twenty-

eight days. This approximates the average time reported by other observers.

3. *The Effect of Massive Doses of Viosterol in Oil.*—Toxic symptoms were not observed in any of the infants during the period of investigation. We do not wish to conclude from this that toxic symptoms cannot be produced by large enough doses of viosterol in oil. This investigation does show, however, the large factor of safety in the administration of larger doses of viosterol to infants, at least over limited periods of time.

4. *The Possible Advantages in Feeding Vitamins A and D (Cod Liver Oil) as Against Optimum Amounts of Vitamin D Alone (Viosterol in Oil).*—No important difference in development was noted. The results must be limited to the period of observation; that is, from birth to 1 year. What effect this difference in feeding would have on subsequent development was not determined in this investigation.

Ultraviolet Rays in Treatment of Alopecia Areata.

F. Narducci.

Gazzetta degli Ospedali e delle Cliniche, 51:428, (April 6), 1930.

Narducci reports the results secured from the use of ultraviolet rays in the treatment of twenty-five cases of alopecia areata. In seventeen cases a complete cure was effected after from sixteen to thirty-five exposures. Four cases (16 per cent) showed no improvement after from ten to thirty-five irradiations. In one case the bald spots that existed at the beginning of treatment became covered with a new growth of hair after a number of irradiations, but two new bald spots developed that were not influenced by a continuation of the treatment. In one case the treatment was interrupted after marked improvement. In two cases the treatment was soon given up (after seven or eight irradiations) without any improvement. Twelve of the patients had only one bald spot, while six had two bald spots. Of the four cases that showed no improvement, one presented multiple bald spots, one three bald spots, one two bald spots, and only one a single bald spot. The author does not wish to contend that general ultraviolet irradiations constitute a specific or even the best means of treating alopecia areata, but that they deserve to be kept in mind in cases in which other methods fail, and are always a good adjuvant in convalescents, along with other local and general treatment.—(Abst. *J. A. M. A.*, July 26, 1930).

Irradiated Milk in Rickets. Mouriquand, Leulier and Schoen.

Rev. de lait, February and March, 1928, Nos. 72-73.

The authors discuss the use of irradiated milk and report the case of a girl, aged 20 months, showing marked rickets, who was treated during the period of twenty-three days with a liter of fresh irradiated milk a day. No other antirachitic treatment was given. At the end of this time, roentgenograms showed definite healing.—(Am. J. Diseases of Children).

Infra-Red Rays in Treatment of Rheumatic Patients. J. van Breeman.

Nederlandsch Maandschrift voor Geneeskunde, 16:567.

Van Breeman urges that authors in reporting treatment with infra-red rays should describe in detail the range of the spectrum, the quantity of energy and the duration of the treatment, so that comparisons of results may be made. One uses infra-red rays almost never alone but with other forms of energy (light, ultraviolet rays). There is a general tendency in connection with chronic rheumatism to consider the following four factors in a causal relation: 1. Focal infection; here the therapeutic indications point to physical therapy but not to infra-red rays; sometimes a vaccine or a tonic for the general condition is desirable, but if light treatment is added, ultraviolet and not infra-red rays are indicated. 2. Constitutional disorders (arthritic diathesis, with which may be grouped disturbances of internal secretion or of the autonomic nervous system); occasionally light baths may be indicated but usually ultraviolet rays will be employed. 3. Disturbances in the blood circulation of the skin. 4. Exogenous factors (climate, humidity, vocation). In classes 3 and 4, physical therapy, and particularly diathermy, is indicated, in which infra-red rays may play an important part. If today an examination of rheumatic patients is incomplete until a focal infection is looked for, such an examination is likewise incomplete unless a special search is made for disturbances of the blood circulation of the skin.—(Abst. *J. A. M. A.*, Aug. 2, 1930).

The Roentgen-Ray Diagnosis of Infantile Scurvy.

Ralph S. Bromer.

Am. J. Roentgenol., 19:113, (Feb.), 1928.

The author summarizes the literature and makes a plea for unification of terminology because of the confusion of "white line," "Trummerfeld zone," and "scurvy line," which are used loosely by many authors. He then discusses the clinical manifestations, pathology, microscopic pathology, roentgenologic changes and differential diagnosis and gives an analysis of cases. The differentiation of coincident rickets, early osteomyelitis, sarcoma, osteochondritis luetica and periostitis luetica may be confusing. In fifty-six cases studied, the concentric ring about the epiphysis (Wimberger's sign) with a ground glass atrophy of the central portion was noted irrespective of the stage of the disease. Four roentgenographic stages are given: 1. An early or latent condition with a smooth, transparent ground glass appearance of the shaft, especially near the diaphyseal end, a thin cortex, and a broadened zone of temporary calcification at the very end of the shaft. 2. A well developed clinical condition with a zone of decreased density just behind the dense broadened zone of temporary calcification at the end of the diaphyseal shadow, "the frame work marrow zone." Lateral spurs or projec-

tions at the diaphyseal end may form. 3. Well developed subperiosteal hemorrhages. The hemorrhagic effusions end abruptly at the diaphysis where the periosteum is firmly attached. Epiphyseal separation often takes place. 4. A healing stage with absorption of hemorrhage and repair of scurvy lesions. The earliest disappearance observed roentgenographically was in one month, while in another case, signs remained after seventeen and one-half months. Periosteal thickening was found after five years. A bibliography is given.—(Am. J. *Diseases of Children*).

Baths as Artificial Climate: Treatment of Rheumatism in Winter. R. F. Fox.

Brit. M. J., 1:994, (May 31), 1930.

Fox lays down what appears to him to be the essential features and conditions of success of a center for physical treatment of rheumatic diseases in a northern climate. In the first place, the center must have for its nucleus a bath clinic, with its proper therapeutic elements—heat, moisture, mechanical stimulation and time. The bath and its surroundings will actually represent a climate in miniature, and it will operate by counteracting climatic influences in those who are injuriously affected by them. To serve this purpose a large warmed building will be required, with a temperature approaching 70° F. in all its parts. The main feature will be the central pool or pools of moving water with its complement of gases, at the selected degree or degrees of heat. In association with these, departments will be provided for treatment by mud, with the proper mud kitchen, by vapor at various temperatures, or by thermal brine. Light and artificial sunshine will certainly have a place, as well as a judicious selection of local and accessory physical treatment. There will also be ample accommodation for manipulations, movements, frictions and switching, and couches for packs and prolonged and quiet resting. An artificial climate will pervade the place, and winter gardens with a subtropical temperature, refreshment rooms, library, games and recreations, and a gymnasium, may properly be included in the scheme. Last, but not least, fountains of soft drinking water, hot and cold, will be provided in all departments for treatment, as the free use of water internally is of great assistance to the external treatment of rheumatism. The great majority of rheumatic persons, in both the early and the later stages of the disease, and many others who suffer from chill, might well be recommended to spend from two to three hours a day in a medical establishment of this description. Men and women after the day's work would take with advantage a couple of hours for treatment, rest and recreation at such a bath clinic. For all serious cases, especially of arthritis, warmed hostels should be available in close proximity.—(Abst. *J. A. M. A.*, July 19, 1930).

Peripheral Nerve Injuries. Walter D. Abbot, M.D.*Jour. Iowa S. M. Soc., June, 1930.*

The post-operative care is probably the most important and certainly is the most trying for surgeon and patient. Immediately after operation the extremity is placed in splints; care must be taken that the bandages will not constrict the blood supply and the joints must have access to some motion. Adhesions must be prevented and the joint should not be continuously mobilized. It is essential that there must be close cooperation between the surgeon, masseur and patient to secure a good result.

Nutritional treatment in the form of heat, massage, electrical stimulation and re-education should begin about the tenth day and must be continued for weeks and months. Immersing the limb in a hot bath produces an excellent increase of blood supply and when trophic ulcers are present radiant heat may be used. Massage should be given ten to twenty minutes each day but it must not proceed to the extent of producing muscle pain or fatigue. It is much better to do too little than to be too zealous in the matter.

Electrical stimulation can be carried out if it is properly used in the hands of a competent therapist.

Before the function begins to return the patient should be instructed in each muscle action and must faithfully attempt to follow this line of re-education. At first the masseur will have to help the patient in working the muscles and again caution must be exerted against fatigue.

Recovery will vary with the ability of the subject to train his cortex to interpret correctly data reaching it through pathways which have been unaccustomed to carrying these new impulses. The surgeon should, if possible, supervise this long period of post-operative care and be ever on the alert to prevent the adoption of easily acquired trick movements or the entire effort will be in vain.

Experimental Studies on the Effect of Irradiated Ergosterol Administered in Large Doses. Bruno Borghi.*Biochim. e terap. sper. 16:113, (April 30), 1929.*

The experiments were made on normal and splenectomized rats. An injection of 10 mg. of irradiated ergosterol was given subcutaneously on alternate days for one month. On autopsy there was no evidence of any changes in the organs which would indicate a picture of hypervitaminosis (deposition of calcium on the walls of the vessels and in various organs). An occasional splenectomized animal showed a swelling of the myocardium and cells in the renal canaliculi. Borghi therefore inclines to the view that the toxicity observed after the administration of ergosterol was not due to the administration of vitamin D but to the presence of toxic substances associated with it.—(Am. J. Diseases of Children).

Habitual Constipation — Therapy. Prof. K. Glaessner.*(From a Paper read at a Meeting of the Vienna Medical Association, February 1930.)*

Chronic constipation is chiefly due to disturbances of the movements of the large intestine, it is usually a case of faecal accumulation in the rectum resulting from the deficiency or complete absence of a reaction to the defaecation stimulus. The peristaltic movements of the intestine are produced by cholin, the hormone of peristalsis, and by mechanical stimulation on the part of the faeces; the impulse prompting defaecation is chiefly due to the chemical stimulus of gases (carbonic acid, hydrogen, methane, sulphuretted hydrogen etc.) and of acids (lactic acid, butyric acid, acetic acid etc.) when the faeces have reached the ampulla recti. Of the gases evacuated through the rectum (about a litre daily) 10% is CO_2 (formed by the fermentation of carbohydrates), 30% methane (i.e. marsh gas arising from the fermentation of cellulose) and almost 60% nitrogen (from air that has been swallowed). In the intestine itself the chief component of the gases is CO_2 . According to Bunge about 6 litres of CO_2 are formed daily in the small intestine, the chief part of which is, however, absorbed by the blood through the wall of the small intestine. In contrast to CO_2 , nitrogen and hydrogen are hardly absorbed at all, O_2 only to a very limited extent and methane (Mercaptan, H_2S) somewhat better. Insufficiency of the circulation and lack of tone in the intestine (atropin!) inhibit the absorption of intestinal gases, intestinal hypertonus (pilocarpin) promotes the absorption. Overburdening of the blood with CO_2 promotes peristalsis because the CO_2 present in the intestines cannot be absorbed (meteorism with weakness of the circulation!) and acts as a vigorous stimulant. If two parts sod. bicarb. plus one part tartaric acid are administered either per rectum (micro-enemas or suppositories with the addition of a lipid binding agent in order to avoid a feeling of burning) or per os (in gelatin capsules hardened by formalin which only dissolve in the jejunum, 6-8 capsules a 0.5 or 0.25 gm.), peristalsis and defaecation are promptly induced because CO_2 is formed in the intestine.

G. HAUFFE, Berlin-Wilmersdorf. (Zeitschrift f. ärztl. Fortbildung, No. 5, 1930.)

This author speaks very highly of Schweninger's two-hour diet. The patient is, at first, given liquid foods only, punctually every two hours until the first stool is passed (even though it take several days and the patient lose weight), chiefly fruit soups alternating with sour milk or peppermint tea or camomile tea. The patient should take everything in sips and quite slowly. When the first defaecation has taken place, vegetables or potatoes, fruit or soft cheese may be intercalated once or twice daily whilst maintaining the two-hour scheme of small meals. If defaecation again fails to occur, the liquid diet (chiefly fruit soups prepared from fresh or dried fruit) should be resumed immediately. The subject should patiently try to effect an evacuation of the bowels every morning at the same hour. Laxatives or enemas should be avoided consistently. If regular movements have been

achieved for a few days, the diet may be changed to alternate liquid and solid meals every two hours and finally to normal diet though the small hourly or two-hourly portions should be kept on for a long time. Any disturbance should be responded to immediately by a fruit-soup day. It is a simple matter to divide the chief meals into separate portions; for instance: at 7 a. m. stewed fruit, 8 a. m. a glass of milk or coffee with milk, 10 a. m. bread and butter, at noon fruit, at 1 p. m. vegetables, 2 p. m. meat with a potato or two, 3 p. m. a sweet dish, 5 p. m. a roll or fruit, 7 p. m. a sandwich or vegetables, at 9 p. m. fruit stewed or raw or cheese. On the next day begin with vegetables, bread or fruit for a change. Finally, even rice, cocoa etc. introduced into the scheme of hourly or two-hourly meals should cause no disturbance.

In addition to the diet, massage, kneading or tapotement (during expiration), of the abdomen, the latter being done by the patient himself, several times daily. Exercises of the abdominal muscles (trunk raising while lying down, during expiration, without support from the hands and without raising the heels from the floor, trunk bending and turning during expiration, leg swinging, knee bending during expiration etc.); all this several times daily. At night the patient should frequently lie on the abdomen and should have hot packs on the abdomen (hot bottles, poultices), possibly hot sitz-baths gradually increasing in temperature before going to bed. (*Ars. Medici*, 8:204 (May) 1930.)

Die Roentgentherapie Der Blepharitiden. (Roentgen ray therapy of blepharitides). Andreas Lusza.

Klin. Monatsbl. f. Augenheilkde., 1930, Bd. 84, (Jan.) p. 76-79.

Even the uppermost layers of the skin do not seem to be efficiently influenced by ointment treatment in these stubborn affections. Quartz light treatment, too, has proved inefficient because of its slight penetration power. As to radium, the dosage requires in turn great circumspection; its principal disadvantage is the unequal irradiation quality on the skin and may in consequence jeopardize the eye-ball. Roentgen ray treatment is free from all these disadvantages. The irradiations were given by a Peo-apparatus and Mueller's "Metalix" lamp. The most efficient therapeutical dose is twice 20 per cent of S.U.D. each, 3 mm. Al. filter, 109 KV-voltage, 4 MA-amperage with an interval of 2 weeks. During the irradiation the eye ball is protected by a glass disk 2 mm. thick, containing 50 percent of lead. The application of the disks has to be preceded by an anaesthetic with cocaine solution. The appearance of erythema is in a manner an indispensable index to improvement. Healing, however, is probably not only due to the produced hyperemia; it is rather more probable that the diminished regenerative capacity of the diseased cells is restored by increased viability of the cells and multiplication of their divisions. The treatment does not produce pigmentation nor atrophy of the skin or trichiasis.

Heart Troubles—Hauffe's Partial Baths. E. Genkin and M. Jassmann.

Zeitschrift für die gesamte physikal. Therapie, Vol. 37, No. 6, 1929.

A report on the results of 30 cases, mostly of myocardopaths as described by Aschoff. Hand baths were given at the ambulatorium at temperatures increasing up to 113°, the baths lasting 15 to 18 minutes; a total of twenty or thirty baths. After the bath a half hour rest in bed and then a lukewarm douche. The local hyperaemia is very intense and often persists for over 24 hours; other parts of the body that have not been bathed often share the hyperaemia. Perspiration usually sets in in the eighth to tenth minute. The pulse frequency increases 10 to 20 beats by then and within 15 to 20 minutes after the partial bath is back to normal. Increased blood pressure sinks 10 to 30 mm after the bath. The cardiac shadow is distinctly smaller, the pulmonary field clearer as a result of the recession of the blood to the periphery. The cure was very successful in 26 cases; dyspnoea improved, likewise sleep, painful sensations, vertigo, etc. Five out of fifteen cases of cardiac hypertrophy and dilatation showed diminution of the cardiac diameter of from 0.1 to 1.0 cm, two cases from 1 to 2 cm, two over 2 cm; ten out of seventeen cases showed a diminution of the aortic shadow in x-ray. The cardiac tones were usually purer after the tenth bath, sometimes, murmurs disappeared. In one case an extrasystole was eliminated. In any case these simple and harmless partial baths are worth more attention in general practice.—(*Ars Medici*, 8:155-156 (April) 1930.)

Tuberkulose Und Solbad. (Tuberculosis and saline bath). A. Bretschneider.

Ztschr. f. Schulgesundheitspf. u. soz. Hygiene, 1930, Jg. 43, Nr. 2, (Jan.) p. 42-44.

The accepted indications for saline baths were heretofore exudative diathesis associated with occult tuberculosis, and for the absorption of exudates in peritoneal tuberculosis after the condition had become latent. The author desires to have the indications for saline baths enlarged by including tuberculosis of the bronchial lymph nodes. He advances reasons to prove that the stimulus of the brine can in no way cause a new infiltration in these forms of tuberculosis of the bronchial lymph nodes. The author vindicates the biologic fundamental law of Arndt and Schultz, also, for the saline bath; this law states that the vital activity of the cells is stimulated by weak irritants, promoted by mild strength, handicapped by strong ones and destroyed by the strongest ones. The thing is of course to establish by the aid of the skiagram and the biological tests which irritant can, or must be employed in order to stimulate, or to promote the vital activity of the cells. For the purpose of grading the irritant it is sufficient to regulate the concentration of the saline bath. Consequently, the author recommends the use of saline baths for those stages and forms of tuberculosis which are at all amenable to irritation.

Diathermy for Chronic Diseases of the Brain and Spinal Cord. F. Kraus.

Medizinische Klinik, No. 50, 1929.

Diathermy not only has the effect of producing hyperaemia and absorption, of alleviating pain and killing bacteria but it also stimulates the functional activity of the organs. A striking improvement in central paresis of the extremities has, for instance, been observed during diathermy treatment of the corresponding segment of the spinal cord. Sagittal diathermy of the head stimulates the function of the diuretic center in the midbrain. The increase of diuresis reaches its climax 24 hours after diathermy treatment. As is demonstrated by the histories of 14 patients, striking results have been achieved in 15 to 20 sittings by diathermy of the head, as intensive as possible, but at fairly long intervals (application of electrodes according to choice, no risk involved) especially in cases of post-encephalitic shaking tremor, tic douloureux encephalitis lethargica, paralysis agitans, chorea minor and in spastic hemiplegia of various etiology (diphtheria, apoplexy, etc.).

Examples: a girl aged 24, shaking tremor of the left side after encephalitis so that the patient could neither stand nor walk. She was sent to the clinic with the request to get her admitted to an institution for incurables. Even after the third treatment by diathermy of the midbrain, the tremor subsided and after 15 sittings it disappeared.—Manager of a bank with severe encephalitis lethargica, almost immobile. After the third treatment a striking change was noticeable, good mobility, improvement of the mask-like appearance of the face; at the end of two months there was no disturbance of speech, very good mobility, the tremor much slighter; the patient resumed his occupation.—A 23 year old mechanic, incapable of work for 4 years on account of spastic hemiplegia following encephalitis. After 15 sittings the paralysis of the arm was almost cured, the patient was able to punch and to walk the long distance to the hospital without effort; outpatient treatment still continued.—A physician suffered from paralysis agitans for the past four years, severe muscular rigidity of the arms and legs, violent shaking tremor. After diathermy of the midbrain and the involved segments of the spinal cord, continued for 10 weeks, the patient is now able, for the first time, to eat by himself and to write again.—A case of chorea post anginam cured by 9 sittings of diathermy of the head in the course of 3 weeks; up to the present 6 months without relapse.—(*Ars Medici, 8:158-159 (April) 1930.*)

**Allgemeinbehandlungen Bei Augenkrankheiten.
(Systemic treatment in diseases of the eye):
Brueckner.**

Fortschr. d. Ther., 1930, Jg. 6, H. 9, (May), p. 257-264.

The sweating treatment in vogue some years ago in various diseases of the eye (iritis, choroiditis, detachment of the retina, optic neuritis) has been disregarded and unfortunately neglected by modern ophthalmology. It was originally conceived that the

beneficial effect was due to dehydration, but in the light of closer investigation it has been found that thirst always renews the supply of fluids. In all likelihood it is the irritative or stimulative effect on the skin which is productive of any beneficial effect. This is based on the importance of the skin as an organ involved in the processes of immunity and universal metabolism. The effect might be due to congestion either of the whole of the body surface or part of it. When sweat baths are administered to rheumatic affections of the eye, the general condition of the patient should be constantly under observation, especially in older people, greatest attention should be given to the heart and vascular system. In patients past the sixties, light baths about the head are on the whole contraindicated by reason that the head is thereby congested. In young people, temperatures beyond 70 degrees C are only exceptionally permissible. Frequently, too little heed is given to the precept that cooling of the patient ought to take place in warm localities.

There is a considerable number of ocular diseases, especially of tuberculous origin, requiring climatherapy. In this respect the high altitude health resorts in Switzerland are of particular value. Irradiation treatment should be substituted for this form of climatherapy, when the latter cannot be carried out. The application of ultraviolet (alpine sun) is first in choice. The author uses only the mercury vapor quartz lamp. The scrofulous and tuberculous affections of the eye constitute the chief indications for its use. Overdosage, however, must strictly be avoided not only for the reason of general skin burns, but above all because of local impairments, e.g., the eruption of new phlyctenes the day after the irradiation. Strong skin pigmentation is considered as a favorable symptom. In scrofula of the eyes in photophobic children, local irradiations of the eyes with calorific rays, as those supplied by the Sollux-lamp, sometimes give very good results. The condition improves frequently as soon after as a few exposures of from 10 to 15 minutes duration.

The Ultraviolet Transmission of Philippine Window Shell. Wm. D. Fleming.

The Philippine Journal of Science, 42:259, June, 1930.

From these data it is evident that the transmission of the shell in the vital region of the ultraviolet is only 3 to 6 per cent.

It would appear from this that in so far as light may be a factor in the low incidence of rickets in the Philippine Islands it is the light received direct and not that through windows of the window shell. This is consistent with the outdoor life induced by the climate of the Islands. The ultraviolet transmission is not sufficient to warrant export of the shell primarily as a competitor of the various special glasses now on the market in the United States. On the other hand this low transmission may be of distinct advantage in its use in any locality where relief from the glare of the sun is sought.

Ueber Die Anwendung Von Kuenstlicher Hyperthermie Als Ersatzmittel Der Experimentellen Fiebertherapie. (On appliance of artificial hyperthermia as a substitute for experimental pyretotherapy). H. Kahler and F. Knollmeyer.

Wien. klin. Woch., 1929, Jg. 42, Nr. 42, (Oct.) p. 1342-1344.

The procedure of artificial hyperthermia was suggested by Walinski. He administered 10 c.c. of a 20 per cent sodium chloride solution to his patients 5 minutes before a tub bath of 37 to 38 degrees C in order to inhibit sweat production; after the bath they were packed into one flannel and six woolen coverlets for several hours. The authors succeeded however in obtaining also very high and protracted increases of body temperature in many cases by applying incandescent lamp baths alone of from 1 to 2 hours duration and subsequently giving careful packings into several coverlets. When a hot tub bath (without previous sodium chloride injection) was given before hot air was applied, then the rise in temperature occurred sooner. A diminution of sweat production owing to sodium chloride injection was only observed in the minority of the cases. Sometimes the effect of the incandescent light bath could be still somewhat increased by a previous subcutaneous injection of 1 milligram of atropin. According to the observations of the authors, intense hot air treatment produces, respectively, hyperthermia as well as genuine fever which is followed by protein decomposition, however small. The therapeutic action was therefore explained on a basis of protein body effect. Hence, it would appear that hyperthermia as provoked by the physical route, through intense hot air treatment, is also apt to replace experimental pyretotherapy in certain cases. The authors have tried hyperthermia treatment, particularly in affections of the nervous system, and in chronic arthritis. General paralysis showed frank clinical improvement and material changes in the condition of the cerebrospinal fluid (marked decrease in the number of the spinal fluid cells, weakening of the Wassermann test and colloidal gold curves) after the treatment; in tabes dorsalis, improvement could be attained only inconsistently. Very good results were obtained in arthritis deformans. Finally, a fall in the blood pressure, though not very marked, could be provoked by intense hot air treatment in several hypertension of central origin. Of course, this treatment can only be used in the absence of stronger circulatory affections. In a case with stenocardia, attacks in luetic mesoarthritis, the symptoms disappeared almost entirely in the course of hyperthermia treatment.

Die Roentgenbestrahlung Des Ulcus Ventriculi Und Der Chronischen Gastritis Und Ihre Indikation. (Roentgen ray treatment of gastric ulcer and chronic gastritis and its indications). Theodor. Jenner.

Arch. f. Verdauungskrankh., 1929, Bd. 46, p. 218-221.

This is a report of 32 cases of gastric ulcer which had defied every medical treatment and were subjected to roentgen ray irradiation. An abdominal field of 10 by 15 cm. was irradiated and was followed by a dorsal field after 4 to 8 days, each field receiving 300 R of rays of medium hardness. The roentgen ray treatment was successful in 25 cases. Roentgen ray treatment should not, as the author expressly emphasizes, supplant well-approved methods of treatment, but only supplement them. Roentgen ray treatment proved particularly efficient in cases associated with spasms and gastritis. The author maintains that the complaints, due to stomach upsets and endoscopically diagnosed to be for the most part due to gastritis, seem to be a satisfactory object for radiotherapy.

Ueber Die Technik der Radiumbehandlung Bei Blutkrankheiten. (On the technique of radium treatment of diseases of the blood). L. Arzt.

Wien. klin. Woch., 1930, Jg. 43, Nr. 23, (June), p. 708.

In blood dyscrasias the organs mostly in need of irradiation are the enlarged lymph nodes, the spleen, and the liver. Only distant irradiation can be applied to organs of abnormal size. This is carried out as follows:—At a distance of 1 cm., determined by applying the radium carrier not directly to the skin but to a cork plate of adequate thickness, generally from 100 to 300 milligram hours are given. In this case only the deep penetrating gamma rays are utilized; the applicators, almost exclusively made up of Dominici tubules, are inserted into brass filters 1 mm. thick. The lymph node packets can, for the most part, be irradiated as a whole from one or at most, two positions of the radium carriers. Irradiation of the spleen, however, requires 3 to 6 fields. When the organ is of considerable size, two fields, each, ought to be irradiated in front, sidewise and posteriorly. The procedure to be observed in irradiation of the liver is similar. As a rule only one application of from 100 to 300 milligram hours per field will not be sufficient; therefore, it is advisable to give an irradiation by series, each field being submitted to two, and if necessary, also to three irradiations. Radium therapy ought to be conducted under control of the hematologist.

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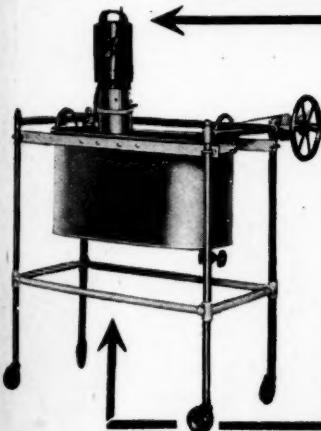
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